

**University of Wisconsin
Communication Sciences and Disorders
Doctor of Audiology Program**

**CS&D 858 Auditory Electrophysiologic Measures I (2 Credits)
Spring 2022**

**Class Meets Mondays 4:15 pm – 5:55 pm
412 Goodnight Hall**

Instructor: Kimberly Falkenstein, AuD, CCC-A
Office Hours: by appointment
Phone: 608.345.7115
Email: kfalkenstein@wisc.edu

This course follows the UW-Madison Definition of Credit Hour – Policy Statement

Generally, UW-Madison will follow the federal credit hour definition: one hour (i.e. 50 minutes) of classroom or direct faculty/qualified instructor instruction and a minimum of two hours of out of class student work each week for approximately fifteen weeks, or the equivalent engagement over a different time-period.

Alternatively, a credit hour will be defined as the learning that takes place in at least 45 hours of learning activities, which include time in lectures or class meetings, in-person or online, laboratories, examinations, presentations, tutorials, preparation, reading, studying, hands-on experiences, and other learning activities; or a demonstration by the student of learning equivalent to that established as the expected product of such a period of study.

In all cases, learning in for-credit courses is guided by a qualified instructor^[1] and includes regular and substantive student-instructor interaction.

For this course, the instructor will provide direct instruction, feedback on student work, and course content consistent with the information posted in this syllabus.

Methods of Communication:

Please contact me at kfalkenstein@wisc.edu or via text/phone 608.345.7115. You will need to log onto canvas site at <https://canvas.wisc.edu/courses/279805> in order to access course content, assignments, rubrics, exams and required readings. It is your responsibility to bring copies of the materials to class and lab if you wish. Printed copies of the content will not be provided.

Recording of classes and labs is not permitted, without the expressed written consent of Kimberly Falkenstein, Au.D. Students with an approved Faculty Notification letter from McBurney Disability Resource Center will be accommodated.

Prerequisites and Co-Requisites:

- Graduate level standing
- Enrollment in CS&D 859

Required Readings:

Katz, J., Chasin, M., English, K., Hood L. and Tillery, K. (Eds.). (2015). *Handbook of Clinical Audiology*, 7th Ed. Philadelphia: Wolters Kluwer.

Durant, J., Fowler, C., Ferraro, J., Purdy, S. (Eds.). (2022). *Basic Concepts of Clinical Electrophysiology in Audiology*. Plural Publishing: SanDiego, CA. (available in electronic format now or print format in February 2022)

Robinette, M. and Glattke, T. (Eds.). (2007). *Otoacoustic Emissions: Clinical Applications*, 3rd ed. Thieme Medical Publishers.

And other readings posted on Canvas.

Course Description:

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.

Course Learning Outcomes:

1. Describe the anatomy and physiology of the cochlea and auditory nervous system
2. Describe how the cochlea and auditory neurons transduce sounds into electric potentials
3. Describe how to record and interpret an EcochG
4. Describe how to record and interpret an auditory brainstem response
5. Differentiate between normal and pathological ABR responses
6. Explain the signals, methods, and principles used for recording AEPs
7. Describe how the cochlea creates otoacoustic emissions
8. Describe how to record and interpret otoacoustic emissions
9. Integrate the information from behavioral and physiological responses to determine the status of the auditory system in a patient.

Instructor Objectives:

1. Provide organized, clear content and instructions for assignments and assessments.
2. Come to class prepared to answer your questions to the best of my ability. At times that may include asking questions back to you to help lead you to understand the topic without directly answering your questions.
3. Be available during lab to address questions/concerns.
4. Provide a safe space for students to work outside their comfort zone, to make mistakes and learn from them.

Course Units:

Unit 1: Introduction to Electrophysiology and Auditory Evoked Potentials

Unit 2: Auditory Anatomy and Physiology

Unit 3: Recording Principles for AEPs

Unit 4: Recording and Interpreting the ABR

Normal Aspects/Pathological Aspects/Infants

Unit 5: Recording and Interpreting the ECochG

Unit 6: Recording and Interpreting OAEs

Origins and Recording Methods/Normal Aspects/Pathological Aspects

Unit 7: Clinical Correlation: OAE and ABR data in case studies

Lecture Schedule: *This is a tentative schedule that is subject to change.

Date	Topic	Readings
1/24	Course Introduction Unit 1: Intro to Electrophys and AEPs Unit 2: Auditory Anatomy and Physiology	-Durant (2022) Ch 1 (textbook) -Katz, J. et. al. (2009). <i>Handbook of Clinical Audiology</i> (6 th ed). Ch 11 – Intro to AEPs (canvas) -ASHA. (1987). Short Latency Auditory Evoked Potentials [Relevant Paper]. Available from www.asha.org/policy . (canvas)
1/31	Unit 2: Auditory Anatomy and Physiology	Required: -Durant (2022) Ch 3 (textbook) -Corey, D. (2003). Sensory transduction in the ear. <i>Journal of Cell Science</i> , 116, 1-3. (canvas) -Demanez, J. & Demanez, L. (2003). Anatomophysiology of the central auditory nervous system: basic concepts. <i>Acta oto-rhino-laryngologica belgica</i> , 57, 227-236. (canvas) Recommended: -Moller, A. (2007). Neural Generators for Auditory Brainstem Evoked Potentials. In Burkard, R., Don, M, & Eggermont, J. (Eds.) <i>Auditory Evoked Potentials: Basic Principles and Clinical Applications</i> . Wolters Kluwer/Lippincott, Williams, & Wilkins: Philadelphia (canvas) -Dallos, P. (1973). <i>The Auditory Periphery: Biophysics and Physiology</i> . Academic Press: New York and London (canvas)
2/7	Unit 3: Recording Principles	Required: -Durant (2022). Ch 2 & 4 (textbook) -Rosen, S. & Howell, P. (1991) An Introduction to Digital Signals and Systems (Ch 14). In <i>Signals and Systems for Speech and Hearing</i> . Academic Press: SanDiego., 283-301. (canvas) Also Review from Week 1: -Katz, J. et. al. (2009). <i>Handbook of Clinical Audiology</i> (6 th ed). Ch 11 – Intro to AEPs (canvas from week 1) -ASHA. (1987). Short Latency Auditory Evoked Potentials [Relevant Paper]. Available from www.asha.org/policy . (canvas)
2/14	Unit 3: Recording Principles continued	

2/21	Unit 4: ABR – Normal Aspects	<p>Durant (2022). Chapter 6: Episodes 1 &4 (you do not need to read the stuff on ASSR) (textbook)</p> <p>Katz (2015) (7th ed). Chapter 14 (textbook)</p> <p>Bauch, CD. & Olsen, WO. (1990). <i>Ear and Hearing</i>, Vol. 11, no. 6, 463-467. (canvas)</p> <p>Sininger, Y. (1992). Establishing Clinical Norms for Auditory Brainstem Response. <i>American Journal of Audiology</i>. July. (canvas)</p>
2/28	Unit 4: ABR – Pathological Aspects	<p>Durant (2022), Chapter 6: Episode 5 (textbook)</p> <p>Katz (2015) (7th ed). Chapter 13 (textbook)</p> <p>Fowler, C. & Durant, J. (1994). Effects of Peripheral Hearing loss on the Auditory Brainstem Response. In Jacobson, JT (ed). <i>Principles and Applications of Auditory Evoked Potentials</i>. Allyn and Bacon. (canvas)</p> <p>Cueva, R. (2004). Auditory Brainstem Response versus Magnetic Resonance Imaging for the Evaluation of Asymmetric Sensorineural Hearing Loss. <i>The Laryngoscope</i>, 114, 1686-1692. (canvas)</p> <p>Bauch, Olsen, Pool. (1996). ABR Indices: sensitivity, specificity, and tumor size. <i>American Journal of Audiology</i>, vol 5, no 1, 97-104.</p> <p>Borg, F. (1982). Correlation Between Auditory Brainstem Response and Speech Discrim Scores in Patients with AN and CHL. <i>Scand Audiol</i>, 11: 245-248. (canvas)</p>
3/7	Unit 4: ABR – Infants	TBD
3/14	UW-Madison Spring Break – No Lecture Midterm Exam for SP students	
3/21	UW-Stevens Point Spring Break – No Lecture Midterm Exam for Madison students	
3/28	Unit 5: ECochG	<p>Durant (2022). Chapter 5 (textbook)</p> <p>Katz (2015). Chapter 12 (textbook)</p>
4/4	Unit 6: OAEs - Origin and Recording Principles	TBD
4/11	Unit 6: OAEs - Normal Aspects	TBD
4/18	Unit 6: OAEs - Pathological Aspects	TBD
4/25	Unit 7: Clinical Correlation Cases	
5/2	Unit 7: Clinical Correlation Cases	

Week of 5/9	Final Exam	
-------------	------------	--

GRADING

Graded Items with Point Values : *Subject to change

Midterm exam 1 - 200

Final exam - 300

Total Points: 500

Exam Format: Exams 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 amount of 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 you agree to all of the rules.

*Subject to change.

Grading Scale: All grades are awarded based on the percentage score earned. Final grades are calculated to the hundredths place and are not rounded. 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

Student Requirements:

You must complete all of the following to pass the course:

Attendance

You are required to attend class & lab and arrive on time and prepared to begin. Any unexcused absences may result in a failing grade for the course. Excused absences will be granted for reasons such as illness/injury, family emergency or major event, travel to a professional conference, etc. Please be prepared to provide documentation for excused absences.

Class Preparation

You should review and be familiar with the content for CS&D 858 & 859 on Canvas for each unit. Assigned readings must be completed before class.

Completion of Exams and Assignments

All exams and other assignments should be completed according to instructions provided and submitted by the deadline given.

KASA/CFCC REQUIREMENTS

The following table shows the CFCC standards that are covered in this course and indicates how they are assessed.

A passing grade is a B or better. If a student fails to complete any of the tasks listed below with a passing grade, they will work with the course instructor to either redo the task or complete an additional task to demonstrate competency with this task. If a student is not able to complete the task, then an improvement plan will be initiated to remediate the skill in question. See the Au.D student handbook section on improvement plans for further details.

KASA Standard	How the standard is assessed	Course or Lab
Foundations of Practice		
A5. Calibration and use of instrumentation according to manufacturers' specifications and accepted standards	Lecture, class discussion, exams Participation in lab, lab assignments, lab practical exam	858 859
A14. Assessment of diagnostic efficiency and efficacy through the use of quantitative data	Lecture, class discussion, exams	858

(e.g., number of tests, standardized test results) and qualitative data (e.g. standardized outcome measures, client/patient reported measures).		
Prevention and Screening		
B3. Participating in programs designed to reduce the effects of noise exposure and agents that are toxic to the auditory and vestibular systems.	Lecture, class discussion, exams	858
B8. Performing developmentally, culturally, and linguistically appropriate hearing screening procedures across the life span.	Participation in lab, lab assignments, and lab practical	859
Audiologic Evaluation		
C1. Gathering, reviewing, and evaluating information from referral sources to facilitate assessment, planning, and identification of potential etiologic factors	Lecture, Class Discussion, Exams	858
C4. Identifying, describing, and differentiating among disorders of the peripheral and central auditory systems and the vestibular system.	Lecture, Class Discussion, Exams Participation in lab, lab assignments, and lab practical	858 859
C11. Selecting, performing, and interpreting physiologic and electrophysiologic test procedures, including electrocochleography, auditory brainstem response with frequency-specific air and bone conduction threshold testing, and click stimuli for neural diagnostic purposes.	Lecture, Class Discussion, Exams Participation in lab, lab assignments, and lab practical	858 859
C12. Selecting, performing, and interpreting otoacoustic emissions testing.	Lecture, Class Discussion, Exams Participation in lab, lab assignments, and lab practical	858 859

C15. Selecting, performing, and interpreting tests to evaluate central auditory processing disorder.	Lecture, Class Discussion, Exams	858
--	----------------------------------	-----

Academic Policies

Privacy of Student Records & the Use of Audio Recorded Lectures Statement

View [more information about FERPA](#).

Lecture materials and recordings for this course 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.

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 confidential feedback is important to me. I strongly encourage you to participate in the course evaluation.

Digital Course Evaluation (AEFIS)

UW-Madison uses a digital course evaluation survey tool called [AEFIS](#). For this course, you will receive an official email two weeks prior to the end of the semester, notifying you that your course

evaluation is available. In the email you will receive a link to log into the course evaluation with your NetID. Evaluations are anonymous. 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.

Students' Rules, [Rights & Responsibilities](#)

Diversity & Inclusion Statement

[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.

Academic Integrity Statement

By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison; academic misconduct is behavior that negatively impacts the integrity of the institution. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these previously listed acts are examples of misconduct which may result in disciplinary action. Examples of disciplinary action include, but is not limited to, failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

Accommodations for Students with Disabilities 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. (See: [McBurney Disability Resource Center](#))

Academic Calendar & Religious Observances