

Course Syllabus

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

Course: CSD 858 Auditory Electrophysiological Measures

Term: Spring, 2019

Class meeting time: Mondays 3:20-5:00 PM

CS&D 858 Physiological Assessment in Audiology I

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.

Class is 2 credits. Class meets 1 hour and 40 minutes each week for 15 weeks. An additional 4 hours per week of outside class times is expected for a 2-credit class; this time includes reading, writing, preparing for exams, and taking some exams.

Instructor: Cynthia G. Fowler, Ph.D.

Email: cynthia.fowler@wisc.edu

Office hours: Wednesday 12-1 PM or by appointment

Office: 382 Goodnight Hall

Required Textbooks:

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

*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 Glatke (eds). (2007) Otoacoustic Emissions: Clinical Applications, 3rd ed. Thieme Medical Publishers.

Note that there are 3 ABR books that are adequate for this class. The Burkard et al. is the preferred book for the class. If the price is abnormally expensive, you can get the Picton book or the Hall book. All these books cover the material, although all are out of print and their prices fluctuate depending on the market.

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.

Course webpage: <https://canvas.wisc.edu>

All course materials and announcements are posted on the website. Be sure to check it regularly.

Course objectives

Upon successfully completing this course, the student will be able to

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
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.

Spring, 2019 Preliminary Syllabus

Jan 28: Auditory Evoked Potentials: Overview

Burkard & Don (2015). Introduction to auditory evoked potentials, Ch. 11 Katz HCA

Jewett DL, Romano MN & Williston JS (1970). Human auditory evoked potentials: Possible brainstem components detected on the scalp. Science 167 #3924

Feb 4: Auditory anatomy and physiology relative to auditory evoked potentials

*Harrison 2007. Ch 7, Anatomy and physiology of the auditory periphery.

*Palmer 2007. Ch 10, Anatomy and physiology of the auditory brainstem.

*Moller 2007. Ch. 16, Neural generators for the auditory brainstem evoked potentials.

Feb 11: Recording methods

*Durrant & Boston, 2007. Stimuli for auditory evoked potentials.

*Thornton, 2007. Instrumentation and recording parameters

Picton et al., 1983. Aspects of averaging. *Seminars in Hearing*. 4: 327-341.

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.

Feb 18: Quiz 1

Feb 25: Electrocochleography (ECoChG)

Santarelli & Arslan, 2015. Electrocochleography. Ch. 12 in Katz HCA

*Schoonhoven, 2007. Responses from the cochlea: Cochlear microphonics, summating potential, and compound action potential.

Margolis, et al., 1992. Tympanic electrocochleography: Normal and abnormal patterns of response. *Audiology* 31: 8-24

Ge X, 2002. Transtympanic electrocochleography: 10 year experience. *Otology-Neurotology* 23: 799-805

Mar 4: ABR: Normal Responses, Conductive and cochlear responses

Hood, 2015. ABR: Estimation of hearing sensitivity Ch14 in Katz HCA

*Burkard & Don, 2007. The auditory brainstem response

Sininger, 1992. Establishing clinical norms for auditory brainstem response. *AJA* 16-18.

Fowler, 1992. Effects of stimulus phase on the normal auditory brainstem response. *JSHR* 35: 167-174.

Fowler & Durrant Ch.10 The effects of peripheral hearing loss on the auditory brainstem response. (Jacobson book)

Mar 11: ABR: Effects of retrocochlear pathology Quiz 2

Musiek et al., 2015. ABR: Differential diagnosis. Ch 13 in Katz HCA

*Musiek, Shinn, & Jirsa, 2007. The auditory brainstem response in auditory nerve and brainstem dysfunction.

Bauch & Olsen, 1990. Ear and Hearing 11: 463-467.

Bauch et al., 1996. ABR Indices: Sensitivity, specificity, and tumor size. AJA 5: 97-104

Schwartz & Morris Ch. 7 Strategies for optimizing the detection of neuropathology from the ABR.

Cueva RA, 2004. Auditory brainstem response vs MRI for the evaluation of asymmetrical sensorineural hearing loss. Laryngoscope, 114: 1686-1692.

Mar 18: Spring Break

Mar 25: Pediatric Audiology: ABR in screening and diagnostics

*Sininger, 2007. The use of auditory brainstem responses in screening for hearing loss and audiometric threshold prediction.

Cone-Wesson, 1995. How accurate are bone-conduction ABR tests? Am J. Audiol. 4:14-19

Stapells, 1994. Low-frequency hearing & the auditory brainstem response. AJA 3:11-13

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

Apr 1: Cases for ABR, Quiz 3

Apr 8: Otoacoustic Emissions: origins and bases of recording;

Prieve & Fitzgerald, 2015. Otoacoustic emissions, Ch. 19 in Katz HCA

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.

Apr 15: 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.

Apr 22: Otoacoustic emissions: Hearing loss and suppression

R&G Ch. 14, 15, 6, 13

Glatcke 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.

Berlin et al., 1992. Does Type I neuron dysfunction reveal itself through lack of efferent suppression? *Hear Res.*

*Hood, 2007. Auditory neuropathy and dys-synchrony.

Apr 29: Clinical correlation: OAE and ABR data in case studies

R&G Ch. 11, 12

Starr et al., 1996. Auditory neuropathy. *Brain* 119: 741-753.

Berlin et al. 1998. Reversing click polarity may uncover auditory neuropathy in infants. *Ear Hear.* 19: 37-47.

Quiz 4.

Exams 25% each

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 –	A	A-B	B	B-C	C	C-D	D	F
Madison								
Letter								
Grade								

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>. (<http://www.wisc.edu/students/UWS14.htm>)

RULES, RIGHTS & RESPONSIBILITIES

- See the Guide's to [Rules, Rights and Responsibilities](http://guide.wisc.edu/undergraduate/#rulesrightsandresponsibilitiestext) (<http://guide.wisc.edu/undergraduate/#rulesrightsandresponsibilitiestext>)

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>

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

Religious Observances and Personal Emergencies

This information is taken from a memo dated 7/22/2005 written by Peter Spear, Provost and Vice Chancellor for Academic Affairs, David Musolf, Secretary of the Faculty, and Lori Berquam, Interim Dean of Students.

“A listing, though not exhaustive, of religious holidays is available on the website:

<http://www.interfaithcalendar.org> (<http://www.interfaithcalendar.org/>). A student’s claim of a religious conflict 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. State law mandates that any student with a conflict between an academic requirement and any religious observance must be given an alternative means of meeting the academic requirement. The law also stipulates that students be given a means by which they can conveniently and confidentially notify an instructor of the conflict...Three guidelines have been developed to provide clarity for both students and instructors: (1) Announce early in the semester that students may notify the instructor within the first two weeks of class of the specific days or dates on which he or she requests relief. Including this information on your course syllabus is another appropriate method to make sure your students are informed of the policy; (2) Make-ups may be scheduled before or after the regularly scheduled requirement; and (3) It is understood that instructors may set reasonable limits on the total number of days claimed by any one student.”

