

CS&D 860: Physiological Assessment in Audiology II  
Instructor: Cynthia G. Fowler  
Fall, 2017  
Preliminary Meeting Schedule

**Course Description:**

**Credits:** 2 semester hours  
**Format:** 1 lecture/discussion session per week

Required texts:

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

Burkard RF, Don M, Eggermont JJ. (Ed.) Auditory Evoked Potentials: Basic Principles and Clinical Application. Wolters Kluwer/Lippincott Williams & Wilkins, 2007.

Recommended texts (optional):

Wiley T.L. & Fowler C.G. Acoustic Immittance Measures in Clinical Audiology: A Primer, Singular Publishing Group, Inc., San Diego, CA, 1997. (Relevant chapters will be posted). Students typically like this book as an overview of tympanometry, but it is getting old. If you do want to purchase it, you can find cheap books online.

Hunter L.L. and Shanaz N. 2014. Acoustic Immittance Measures. Plural Publishers, Inc San Diego. This book does overlap quite a bit of the information that is in the Katz book, so it isn't required that you purchase it. I will post some of the relevant chapters and you can let me know if they are helpful.

Additional readings accompany each topic.

Grading: Exams = 75%  
Presentation @ 25%

Date   Topic

**Sept 11**   **COURSE LOGISTICS, PRINCIPLES OF AI, and VECTOR TYMPANOMETRY**

Wiley, T.L., & Stoppenbach, D.T. (2002). Basic principles of acoustic immittance measures, in J. Katz (Ed.). Handbook of Clinical Audiology, Baltimore: Williams & Wilkins, 5th Edition, Chapter 11.

Zwislocki, J. (1963). An acoustic method for clinical examination of the ear, Journal of Speech and Hearing Research, 6, 303-314.

ANSI (1987, R2012). American National Standard Specifications for Instruments to Measure Aural Acoustic Impedance and Admittance (Aural Acoustic Immittance), New York: American National Standards Institute, ANSI S3.39-1987 (2002).

### **ACOUSTIC IMMITTANCE: VECTOR TYMPANOMETRY**

Hunter & Sanford (2015) Ch 9, Tympanometry and Wideband Acoustic Immittance, in Katz et al (eds): Handbook of Clinical Audiology, 7<sup>th</sup> edition

Fowler, C.G., & Shanks, J. E. (2002). Tympanometry, in J. Katz (Ed.). Handbook of Clinical Audiology, Baltimore: Williams & Wilkins, 5th Edition, Ch. 12.

Shanks, J.E., Stelmachowicz, P.G., Beauchaine, K.L., & Schulte, L. (1992). Equivalent ear canal volumes in children pre- and post-tympanostomy tube insertion, J Speech Hear Res, 35, 936-941.

ASHA (1997). American Speech-Language-Hearing Association. Guidelines for Audiologic Screening. Rockville, MD: American Speech-Language-Hearing Association, 1. Guidelines for Screening Infants and Children for Outer and Middle Ear Disorders, Birth Through 18 Years, 15-22.

DeChicchis, A.R., Todd, N.W., & Nozza, R.J. (2000). Developmental changes in aural acoustic admittance measurements, J Am Acad Audiol, 11(2), 97-102.

Roup C, Wiley TL, Safady S, & Stoppenbach DT. (1998). Middle-ear screening in adults: Tympanometric norms, Am J Audiol, 7, 1-6.

Wiley, T.W., and Fowler, C.G. (1997). Screening Applications, in Acoustic Immittance Measures in Clinical Audiology: A Primer. San Diego: Singular Publishing Group, Inc., Ch. 7.

Nozza R.J., et al. ((1992). Towards the validation of aural acoustic immittance measures for diagnosis of middle ear effusion in children. Ear Hear. 13 (6): 442-453.

Nozza R.J. et al. (1994) Identification of middle ear effusion by aural acoustic admittance and otoscopy. Ear Hear. 15 (4): 310-323.

### **Sept 18. ACOUSTIC IMMITTANCE: MULTIFREQUENCY, COMPONENT TYMPANOMETRY**

Fowler, C.G., & Shanks, J.E. (2002). Tympanometry, in J. Katz (Ed.). Handbook of Clinical Audiology, Baltimore: Williams & Wilkins, 5th Edition, Chapter 12.

Calandruccio L, Fitzgerald TS, & Prieve BA. (2006). Normative Multifrequency Tympanometry in Infants and Toddlers. J Am Acad Audiol 17: 470-480.

Colletti, V. (1976). Tympanometry from 200 to 2000 Hz probe tone, Audiology, 15, 106-119.

Shanks, J.E., Wilson, R.H., Cambron, N (1993). Multifrequency tympanometry: Effects of ear canal volume compensation on static acoustic admittance and estimates of middle ear resonance. JSHR 36(1): 178-185

Sprague, B., Wiley, T. L., & Goldstein, R. (1985). Tympanometric and acoustic-reflex studies in neonates, Journal of Speech and Hearing Research, 28, 265-272

Holte, L. (1996). Aging effects in multifrequency tympanometry. Ear Hear 17 (1) 12-18.

Margolis et al. (2003). Tympanometry in newborn infants—1 kHz norms. JAAA 14(7): 383-392.

Zhao et al. (2002) Middle ear dynamic characteristics in patients with otosclerosis. Ear Hear 23 (2): 150-158.

### **Sept 25. ACOUSTIC IMMITTANCE: ACOUSTIC REFLEXES**

Feeney and Schairer SA. (2015). Ch 10, Acoustic Stapedius Reflex Measurements, in J. Katz et al. (Ed.). Handbook of Clinical Audiology, 7<sup>th</sup> edition..

Wiley TW & Fowler CG. (1997). Stapedial Reflex Measures, in Acoustic Immittance Measures in Clinical Audiology: A Primer. San Diego: Singular Publishing Group, Inc., Ch 6.

Lyon MJ. (1978). The central location of the motor neurons to the stapedius muscle in the cat, Brain Research, 143, 437-444.

Wilson RH. & Margolis RH. (1999). Acoustic-reflex measurements, in Musiek, FE. & Rintelmann, WF. (ed.), Contemporary Perspectives in Hearing Assessment, Chapter 5, 131-165.

Wiley T & Block MG.(1984). Acoustic and Nonacoustic Reflex Patterns in Audiologic Diagnosis, in Silman S. (ed.), The Acoustic Reflex: Basic Principles and Clinical Applications, New York: Academic Press, Chap. 11, 387-411.

Fowler CG & Wilson RH. (1984). Adaptation of the acoustic reflex. Ear Hear, 5, 281-288.

Hunter LL, Ries DT, Schlauch RS, Levine SC, & Ward WD. (1999). Safety and clinical performance of acoustic reflex tests. Ear Hear. 20: 506-514.

### **Oct 2. Acoustic Reflectance**

Keefe & Feeney (2009). Ch 8, Principles of acoustic immittance and acoustic transfer functions, in Katz et al (eds): Handbook of Clinical Audiology, 6<sup>th</sup> edition

Feeney MP & Keefe DH. (1999). Acoustic reflex detection using wide-band acoustic reflectance, admittance, and power measurements. *J Speech Lang Hear Res.* 42(5):1029-41.

Feeney MP, Grant IL, Marryott LP. (2003). Wideband energy reflectance measurements in adults with middle-ear disorders. *J Speech Lang Hear Res.* 46(4):901-11.

Feeney MP, & Sanford CA (2005). Detection of acoustic stapedius reflex in infants using wideband energy reflectance and admittance. *J Am Acad Audiol* 16: 278-290.

Keefe DH et al. (2000). Identification of neonatal hearing impairment: Ear canal measurements of acoustic admittance and reflectance. *Ear Hear* 21 (5): 443-61.

### **Oct 9 MFT and Reflectance Cases**

### **Oct 16 Quiz 1**

### **Oct 23. INTRODUCTION TO ADVANCED AEP**

Davis H & Hirsh S (1979). *Audiology*, 18: 445-461.

McPherson D. & Starr A. (1993). Binaural interaction in auditory evoked potentials: brainstem, middle, and long-latency components. *Hear Res* 66:91-98

### **Oct 30. AUDITORY MIDDLE AND LATE POTENTIALS**

Cacace A. & McFarland D. (2015). Ch 17, Middle latency auditory evoked potentials. Katz et al. (Ed.). Handbook of Clinical Audiology, 7<sup>th</sup> edition

Tremblay & Clinard. (2015). Ch 18, Cortical Auditory-Evoked Potentials Katz et al. (Ed.). Handbook of Clinical Audiology, 7th Edition.

Pratt (2007) Ch 22, Middle Latency Responses. In Burkard, Don, & Eggermont.

Martin, Tremblay, & Stapells (2007). Ch. Principles and Applications of Cortical Evoked Potentials, in Burkard, Don, & Eggermont.

Kraus N, McGee TJ, & Comperatore (1989). MLRs in children are consistently present during wakefulness, stage 1, and REM sleep. *Ear Hear*, 17:419-429

Galambos, Makeig, & Talmachoff, *Proc Natl Acad Sci* 78:2643-2647

Kileny P. & Kimink, (1987). Electrically evoked middle latency auditory evoked potentials in cochlear implant candidates. *Arch Otolaryngol* 113: 1072-1077

Woods D. & Clayworth, (1986) Age related changes in human middle latency auditory evoked potentials. *Electroencephalogr and Clin Neurophysiol* 65-297-303

### **Nov 6. CORTICAL EVENT RELATED POTENTIALS (MMN AND P300)**

Starr & Golob. (2007). Ch. 24, Cognitive Factors Modulating Auditory Cortical Potentials. In Burkard, Donn, & Eggermont (eds).

Polich J, Howard L, Starr A. (1985). Effects of age on the P300 component of the event-related potential from auditory stimuli: peak definition, variation, and measurement. *J Gerontol.* 40(6):721-6

Polich & Herbst (2000). The P300 as a clinical assay: Rationale, Evaluation, and Findings. *Int J Psychophysiol* 38: 3-19.

Naatanen, R. (1995). The mismatch negativity: A powerful tool for cognitive neuroscience. *Ear and Hearing* 16: 6-18

Kutas & Hillyard, (1980). Reading senseless sentences: Brain potentials reflect semantic incongruity. *Science* 207: 203-205

### **Nov 13. AUDITORY STEADY STATE POTENTIALS**

Dimitrinjevic & Cone (2015). Ch 15, Auditory Steady-State Response. Katz et al. (eds) *Handbook of Clinical Audiology*, 7<sup>th</sup> edition.

Picton TW et al. (2007). Ch. 21, Audiometry Using Auditory Steady-State Responses. Burkard, Don, & Eggermont (eds).

Rance, Rickards, Cohen, DeVidi, & Clark R, (1998). The automated prediction of hearing thresholds in sleeping subjects using auditory steady state evoked responses. *Ear Hear* 19: 48-61.

Boettcher FA, Poth, EA, Mills, JH, & Dubno, JR. (2001). The amplitude-modulation following response in young and aged human subjects. *Hear Res*, 153(1-2), 32-42.

### **Quiz 2**

**Nov 20. STUDENT PRESENTATIONS:** Tympanometry-multifrequency; resonance; norms in special populations

**Nov 27. STUDENT PRESENTATIONS:** Middle ear measures: energy reflectance; measures in disorders; specific applications of acoustic reflexes

**Dec 4. STUDENT PRESENTATIONS:** AEP and aging; AEP and binaural processing; AEP in specific disorders

**Dec 11. STUDENT PRESENTATIONS:** AEP and cognition; AEP, cochlear implants, and auditory development; electric-evoked potentials in CI

### **Quiz 3**

#### **PRESENTATIONS:**

You will make one presentation (20 minutes) to the class that investigates in more depth one of the topics covered in class.

Your responsibilities regarding the presentation are the following:

1. Choose your topic and have it approved by October 1.
2. One week prior to the presentation, you will email a draft copy of your powerpoint presentation to the instructor. I will review and comment on the draft and get it back to you for corrections, suggestions, etc. At this time, also send me by email 1 peer-reviewed article on your topic. These will be posted for the class members, who should read the articles and be prepared to engage in a discussion of the topic on the day of presentation.
3. You will email to the class and me the finished presentation in NO LATER than 5 PM the day before the presentation.
4. Members of the class should print out the presentations and have them ready by the start of the class.
5. The presentation should contain the following elements: Title page, Outline, Short literature review, case (if appropriate), and “take home points”, and references. References must be from the peer-reviewed literature, although you may use illustrations from the web.

#### **Methods of communication:**

We will be using Learn@UW for the class. I will post announcements on the “News” section of the course. Be sure to check it regularly.

For comments and questions, email is the best way to contact me.

Office hours are one hour before class or by appointment in person or by telephone. Please email your request to me and we will schedule the appointment.

#### **Grading Scale:**

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

<b>UW – SP</b> Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
<b>Percentage</b>	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
<b>UW – Madison</b> Letter Grade	A	A-B		B	B-C		C	C-D		D	F

### Academic Integrity

All students should be aware of the expectations for academic integrity at the University of Wisconsin. The following information is from *Academic Misconduct Rules and Procedures: Guide for Instructors* prepared by the Office of the Dean of Students, 75 Bascom Hall (Fall 2001):

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: (I) 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: 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.

"Plagiarism means presenting the works or ideas of others without giving credit. You should know the principles of plagiarism and the correct rules for citing sources...If you are unsure about the proper ways to give credit to sources... consult the Writing Center."

These rules apply to PowerPoint slides as well as to papers.

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.htm>

**Online Information:**

- Student Conduct and Disciplinary Rules (Home)
  - <http://www.wisc.edu/students/conduct/conduct.htm>
- Academic Misconduct: Guide for Students
  - <http://www.wisc.edu/students/resources/misconduct.htm>
- UWS14, Regent Rule on Academic Misconduct
  - <http://www.wisc.edu/students/conduct/uws14.htm>

**Students with Disabilities**

I wish to fully include persons with disabilities in this course. Please let me know if you need accommodations in the curriculum, instruction, or assessments in this course to enable you to fully participate. I will attempt to maintain confidentiality of the information you share with me.

Your success in this class is important to me. If there are circumstances that may affect your performance in this class, please let me know as soon as possible so that we may work together to develop strategies for adapting assignments to meet both your needs and the requirements of the course. The McBurney Disability Resource Center (608-263-2741) provides resources for students with disabilities. You will need to provide documentation of disability to them in order to receive official university services and accommodations.

Please don't hesitate to let me know if you require assistance or accommodations for any reason. I look forward to working with you to meet your learning goals.

The University of Wisconsin-Madison provides reasonable accommodations for students with documented disabilities. Students with documented disabilities who are requesting classroom accommodations need to contact me as soon as possible and provide a copy of their McBurney service plan (VISA). I look forward to working with you on classroom access.

Further information for students with disabilities:  
Access and Accommodation Resource Coordinators  
<http://www.wisc.edu/adac/aarc2>  
Equity & Diversity Resource Center  
<http://www.wisc.edu/edrc/disability/>  
Facilities Access  
<http://www.fpm.wisc.edu/accessibility/>



McBurney Disability Resource Center

<http://www.dcs.wisc.edu/mcb/>

Madison ADA Policies

<http://www.wisc.edu/adac/>

### **Writing Center:**

The Writing Center is located in 6171 Helen C. White Hall. The website is <http://www.wisc.edu/writing/>. The hours are Monday – Thursday 9:00 am to 8:30 pm, Friday 9:00 am to 3:00 pm. Telephone 263-1992. The Writing Center has several experienced instructors available to help students develop and organize ideas, offer constructive criticism and advice for revisions. The major purpose of The Writing Center is to teach students to be more effective writers. The Writing Center also offers information on how to site resources accurately.

### **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>. 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.”*

Information for KASA

<b>Knowledge assessed through written or oral examination.</b>	ASHA Ref
<b>The student will. . .</b>	
Embryology and development of the auditory and vestibular systems, anatomy and physiology, neuroanatomy and neurophysiology, and pathophysiology	A1

Normal aspects of auditory physiology over the life span.	A3
Patient characteristics (e.g., age, demographics, cultural and linguistic diversity, medical history and status, cognitive status, and physical and sensory abilities) and how they relate to clinical service	A9
Instrumentation and bioelectric hazards	A13
Physical characteristics and measurement of electric and other non-electric acoustic stimuli	A14
The use of instrumentation according to manufacturer's specifications and recommendations	A24
Determining whether instrumentation is in calibration according to accepted standards	A25
Screen individuals for hearing impairments and other factors affecting communication function using clinically appropriate, culturally sensitive, and age- and site-specific screening measures.	B3
Measuring and interpreting sensory and motor evoked potentials, electromyography, and other electrodiagnostic test for purposes of neurophysiologic intraoperative monitoring and cranial nerve assessment	C1
Assessing individuals with suspected disorders of hearing, communication, balance, and related systems.	C2
Conducting and interpreting behavioral and/or electrophysiologic methods to hearing thresholds and auditory neural function.	C5
Conducting and interpreting otoacoustic emissions and acoustic immittance (reflexes): Immittance	C7