



Instructor: Samira Anderson, Au.D., Ph.D. Email: sander22@umd.edu  
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Dept. Phone: 301-405-4213  
Office Hours: By appointment (zoom or in-person depending on your preference)  
Meeting Time: Thursdays, 9 – 11:30 AM  
Meeting Location: Woods 1130  
Prerequisites: HESP 606

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### **Learner Outcomes**

This course covers advanced clinical and experimental methods for evaluation of the peripheral and central auditory systems, including procedural considerations and interpretation of test results. After completing this course, you will be able to:

1. Demonstrate the ability to administer, interpret, and report the results of advanced audiological evaluations that incorporate advanced immittance measures, otoacoustic emissions testing, auditory processing evaluations, tinnitus evaluations, and tests of non-organic hearing loss.
2. Demonstrate knowledge of the underlying physiological mechanisms contributing to auditory disorders and the ability to communicate this information to patients and other professionals in everyday language.
3. Critically evaluate new research that aims to improve diagnosis and management of auditory disorders.

### **ASHA Certification Standards (KASA)**

A1, A2, A4, A5, A7, A8, A12, A13, A14, A17, B1, B2, B8, C1, C2, C3, C4, C12, C13, C14, C15, D1, E22, E24,

### **REQUIRED READINGS**

Dhar, S. and Hall, J.W. (2018). *Otoacoustic Emissions: Principles, Procedures, and Protocols, 2<sup>nd</sup> Edition*. San Diego: Plural Publishing.

Katz, J. (2015). *Handbook of Clinical Audiology, 7<sup>th</sup> Edition*. Philadelphia: Lippincott Williams & Wilcott.

### **Learning Assessments**

1. On-line Quizzes: Students will complete 8 quizzes on the course ELMS site that cover lecture content and readings from the textbook and articles. These quizzes are “open-book” in that students have access to the text while taking the quiz. The students will have one week to complete the quiz. The quizzes are timed – but you will have 4 hours to complete it. Once you’ve started the quiz, you must finish it – you can’t go back to it later. The quizzes can be used as a study guide for the midterm and final as many multiple choice questions come from the on-line quizzes and Kahoots.

Date Assigned	Topic	Date Due
February 3	OAEs Anatomy & physiology, classification, instrumentation, calibration	February 10
February 10	OAEs Clinical measurement, protocols, analyses	February 17
February 17	OAEs Clinical applications and efferent measurement	February 24
March 3	Advanced immittance	March 17
March 31	Non-organic hearing loss, APD neural mechanisms	April 7
April 7	APD screening and evaluation	April 21
April 14	APD differential diagnosis and management	April 28
April 21	Tinnitus assessment and treatment	April 28

2. Practical Lab Exercises and Reports: Students will complete practical lab assignments using appropriate assessment tools and will submit a report for each lab. See the course ELMS site for more specific information on these assignments. Please submit all assignments in electronic format online by midnight on the due date. Although you may consult your textbooks and other resources, including your classmates, as you work on each lab, please make sure your write-up is your own. Please contact me as soon as possible if you have difficulties with or questions about a particular lab assignment, so that they can be resolved in plenty of time for you to complete the lab by the due date, and so that you have a better understanding the relevant concepts prior to exams. If there are any equipment problems or malfunctions, the due dates will be extended. The labs will cover the following topics:

Date Assigned	Topic	Date Due
February 10	OAEs	February 24
March 3	Advanced Immittance	March 31
April 7	Non-organic hearing loss	April 21
April 21	APD Evaluation	May 5

Article Reviews: Student will choose one article from the syllabus and will prepare and present powerpoint slides that summarize the article's introduction, method, results (review each figure), and discussion. In addition, students will critique the article, suggest ways to improve the research, propose a new research question, and engage the class with at least one question. The presentation should not exceed 15 minutes. A grading rubric will be posted on ELMS.

Topic	Date	Student
OAEs	2/24	Marjan
Wideband Immittance	3/31	Ally
CAPD	4/7	Danielle
Tinnitus	4/14	Daniel

# Course Schedule

## Module 1 – Otoacoustic Emissions

Date	Topics	Readings
January 26	Introduction; Class expectations; Otoacoustic emissions: Overview, Anatomy & Physiology	<ol style="list-style-type: none"> <li>1. Dhar and Hall, Text, Chapters 1 and 2</li> <li>2. Kemp, D. T. (2002). Otoacoustic emissions, their origin in cochlear function, and use. <i>British Medical Bulletin</i>, 63, 223-241.</li> <li>3. *Abdala, C., and Keefe, D. H. (2006). "Effects of middle-ear immaturity on distortion product otoacoustic emission suppression tuning in infant ears," <i>J Acoust Soc Am</i> 120, 3832-3842.</li> </ol>
February 3	Otoacoustic Emissions: Classification, instrumentation, calibration	<ol style="list-style-type: none"> <li>1. Dhar and Hall, Text, Chapters 3 and 4</li> <li>2. Katz, Text, Chapter 19, 357-364</li> <li>3. Shera, C. A., and John J. Guinan, J. (1999). "Evoked otoacoustic emissions arise by two fundamentally different mechanisms: A taxonomy for mammalian OAEs," <i>J Acoust Soc Am</i> 105, 782-798.</li> <li>4. *Maxim T, Shera CA, Charaziak KK, Abdala C (2019) Effects of forward- and emitted-pressure calibrations on the variability of otoacoustic emission measurements across repeated probe fits. <i>Ear Hear</i> 40:1345-1358.</li> <li>5. *Go, N. A., Stamper, G. C., &amp; Johnson, T. A. (2019). Cochlear Mechanisms and Otoacoustic Emission Test Performance. <i>Ear and hearing</i>, 40(2), 401–417. <a href="https://doi.org/10.1097/AUD.0000000000000625">https://doi.org/10.1097/AUD.0000000000000625</a></li> </ol>
February 10	Otoacoustic Emissions: Clinical measurement, protocols, and analyses	<ol style="list-style-type: none"> <li>1. Dhar and Hall, Text, Chapters 5 and 6</li> <li>2. Katz, Text, Chapter 19, 364-372</li> <li>3. *Blankenship, C. M., Hunter, L. L., Keefe, D. H., Feeney, M. P., Brown, D. K., McCune, A., Fitzpatrick, D. F., Lin, L. J. E., and hearing (2018). "Optimizing clinical interpretation of distortion product otoacoustic emissions in infants," 39, 1075-1090.</li> <li>4. *Cedars, E., Kriss, H., Lazar, A. A., Chan, C., and Chan, D. K. J. P. o. (2018). "Use of otoacoustic emissions to improve outcomes and reduce disparities in a community preschool hearing screening program," 13, e0208050.</li> </ol>
February 17	Otoacoustic Emissions: Clinical applications and Efferent measurement	<ol style="list-style-type: none"> <li>1. Dhar and Hall, Text, Chapters 7-9</li> <li>2. *Iliadou, V. V., Weihing, J., Chermak, G. D., and Bamiou, D. (2018). "Otoacoustic emission suppression in children diagnosed with central auditory processing disorder and speech in noise perception deficits."</li> <li>3. *Konrad-Martin, D., Knight, K., McMillan, G. P., Dreisbach, L. E., Nelson, E., and Dille, M. (2017). "Long-term variability of distortion-product otoacoustic emissions in infants and children and its relation to pediatric ototoxicity monitoring," <i>Ear Hear</i>.</li> <li>4. *Marian, V., Lam, T. Q., Hayakawa, S., &amp; Dhar, S. (2018). Spontaneous Otoacoustic Emissions Reveal an Efficient Auditory Efferent Network. <i>Journal of speech, language, and hearing research : JSLHR</i>, 61(11), 2827–2832. <a href="https://doi.org/10.1044/2018_JSLHR-H-18-0025">https://doi.org/10.1044/2018_JSLHR-H-18-0025</a></li> <li>5. *Smith, S.B., and Cone, B. (2021). "Efferent unmasking of speech-in-noise encoding?" <i>Int J Audiol</i> doi: 10.1080/14992027.2020.1862425.</li> </ol>

## Module 2 – Advanced Immittance Measures

February 24	Multi-frequency tympanometry; Wideband reflectance intro	<ol style="list-style-type: none"> <li>1. Katz, Text, Chapter 9, pp 149-161</li> <li>2. *Sugasawa, K., Iwasaki, S., Fujimoto, C., Kinoshita, M., Inoue, A., Egami, N., Ushio, M., Chihara, Y., and Yamasoba, T. (2013). "Diagnostic usefulness of multifrequency tympanometry for Meniere's disease," <i>Audiol Neurootol</i> 18, 152-160.</li> </ol>
March 3	Wideband reflectance Review for midterm	<ol style="list-style-type: none"> <li>1. *Niemczyk, E., Lachowska, M., Tataj, E., Kurczak, K., and Niemczyk, K. (2018). "Wideband tympanometry and absorbance measurements in otosclerotic ears," <i>The Laryngoscope</i>.</li> <li>2. *Hunter, L. L., Keefe, D. H., Feeney, M. P., Fitzpatrick, D. F., and Lin, L. (2016). "Longitudinal development of wideband reflectance tympanometry in normal and at-risk infants," <i>Hear Res</i>.</li> <li>3. *Prieve, B. A., Feeney, M. P., Stenfelt, S., and Shahnaz, N. (2013). "Prediction of conductive hearing loss using wideband acoustic immittance," <i>Ear Hear</i> 34, 54S-59S.</li> </ol>

## Module 3 – Non-organic hearing loss and Auditory Processing Disorder

April 7	Non-organic hearing loss, Introduction to APD, Anatomy and Physiology	<ol style="list-style-type: none"> <li>1. Katz, Text, Chapters 27-28</li> <li>2. *Durmaz A, Karahatay S, Satar B, Birkent H, Hidir Y (2009) Efficiency of Stenger test in confirming profound, unilateral pseudohypacusis. J Laryngol Otol 123:840-844.</li> <li>3. Skarzynski, P. H., Raj-Koziak, D., Rajchel, J. J., and Skarzynski, H. (2017). "Management of non-organic hearing loss in children – A case study," International Journal of Pediatric Otorhinolaryngology 97, 223-227.</li> <li>4. *Sanes, D., and Constantine-Paton, M. (1985). "The sharpening of frequency tuning curves requires patterned activity during development in the mouse, <i>Mus musculus</i>," J Neurosci 5, 1152-1166.</li> <li>5. *Kopp-Scheinflug, C., and Tempel, B. L. (2015). "Decreased temporal precision of neuronal signaling as a candidate mechanism of auditory processing disorder," Hear Res 330, 213-220.</li> </ol>
March 17	No Class – Take Home Midterm	
March 24	Spring Break	
March 31	APD screening and evaluation	<ol style="list-style-type: none"> <li>1. Katz Handbook, Chapter 29</li> <li>2. *Moncrieff, D., Miller, E., and Hill, E. (2018). "Screening tests reveal high risk among adjudicated adolescents of auditory processing and language disorders," 61, 924-935.</li> <li>3. *O'Hara, B., and Mealings, K. J. I. j. o. a. (2018). "Developing the Auditory Processing Domains Questionnaire (APDQ): A differential screening tool for auditory processing disorder," 57, 764-775.</li> <li>4. Iliadou, V., and Kiese-Himmel, C. (2018). "Common misconceptions regarding pediatric auditory processing disorder," Front Neurol 8.</li> <li>5. Moore, D. R. (2018). "Guest Editorial: Auditory Processing Disorder," 39, 617-620.</li> </ol>
April 7	APD differential diagnosis and management	<ol style="list-style-type: none"> <li>1. Katz Handbook, Chapters 29 and 30</li> <li>2. *Stavrinou, G., Iliadou, V.-M., Edwards, L., Sirimanna, T., and Bamiou, D.-E. (2018). "The relationship between types of attention and auditory processing skills: Reconsidering auditory processing disorder diagnosis," Front Psychol 9.</li> <li>3. *Saunders GH, Frederick MT, Arnold M, Silverman S, Chisolm TH, Myers P (2015) Auditory difficulties in blast-exposed Veterans with clinically normal hearing. J Rehabil Res Dev 52:343-360.</li> <li>4. *Osisanya, A., and Adewunmi, A. T. (2018). "Evidence-based interventions of dichotic listening training, compensatory strategies and combined therapies in managing pupils with auditory processing disorders," Int J Audiol 57, 115-123.</li> <li>6. *Loo, J. H. Y., Rosen, S., and Bamiou, D.-E. (2016). "Auditory training effects on the listening skills of children with auditory processing disorder," Ear Hear 37, 38-47.</li> </ol>
<b>Module 4 – Tinnitus</b>		
April 14	Tinnitus neural mechanisms	<ol style="list-style-type: none"> <li>2. Henry JA, Roberts LE, Caspary DM, Theodoroff SM, Salvi RJ (2014) Underlying mechanisms of tinnitus: review and clinical implications. J Am Acad Audiol 25:5-22.</li> <li>3. *Weisz, N., Hartmann, T., Dohrmann, K., Schlee, W., &amp; Norena, A. (2006). High-frequency tinnitus without hearing loss does not mean absence of deafferentation. Hearing research, 222(1-2), 108–114</li> <li>4. *Hébert, S., Fournier, P., &amp; Noreña, A. (2013). The auditory sensitivity is increased in tinnitus ears. The Journal of neuroscience : the official journal of the Society for Neuroscience, 33(6), 2356–2364.</li> </ol>

		<p>5. *Leaver AM, Renier L, Chevillet MA, Morgan S, Kim HJ, Rauschecker JP (2011) Dysregulation of limbic and auditory networks in tinnitus. <i>Neuron</i> 69:33-43.</p> <p>6. *Bramhall NF, McMillan GP, Gallun FJ, Konrad-Martin D (2019) Auditory brainstem response demonstrates that reduced peripheral auditory input is associated with self-report of tinnitus. <i>J Acoust Soc Am</i> 146:3849.</p>
April 21	Tinnitus Assessment and Treatment	<p>2. *McKenna L, Marks EM, Vogt F (2018) Mindfulness-based cognitive therapy for chronic tinnitus: evaluation of benefits in a large sample of patients attending a tinnitus clinic. <i>Ear Hear</i> 39:359-366.</p> <p>3. *Pierzycki RH, Edmondson-Jones M, Dawes P, Munro KJ, Moore DR, Kitterick PT (2016) Tinnitus and Sleep Difficulties After Cochlear Implantation. <i>Ear Hear</i> 37:e402-e408.</p> <p>4. *Fournier P, Cuvillier A-F, Gallego S, Paolino F, Paolino M, Quemar A, Londero A, Norena A (2018) A new method for assessing masking and residual inhibition of tinnitus. <i>Trends Hear</i> 22:1-19.</p> <p>5. *Watts EJ, Fackrell K, Smith S, Sheldrake J, Haider H, Hoare DJ (2018) Why Is Tinnitus a Problem? A Qualitative Analysis of Problems Reported by Tinnitus Patients. <i>Trends Hear</i> 22:1-10.</p> <p>6. *Berger, J. I., Owen, W., Wilson, C. A., Hockley, A., Coomber, B., Palmer, A. R., and Wallace, M. N. (2018). "Gap-induced reductions of evoked potentials in the auditory cortex: A possible objective marker for the presence of tinnitus in animals," <i>Brain Res</i> 1679, 101-108.</p> <p>5. *Henry JA, Griest S, Thielman E, McMillan G, Kaelin C, Carlson KF (2015) Tinnitus Functional Index: Development, validation, outcomes research, and clinical application. <i>Hear Res</i> 334:58-64.</p>
April 28	Guest Lecturer – Dr. Larry Medwetsky – Sensory Processing Disorder	
May 5	Final Review	
May 12	<b>Final</b>	

Learning Assessments	#	Points Each	Category Total	Category Weight
Labs	4	25	100	18%
Article review	1	25	25	4%
Quizzes	8	20	160	29%
Midterm	1	125	125	22%
Final	1	150	150	27%
<b>Total Points:</b>			<b>560</b>	

Final Grade Cutoffs					
+	98.00%	+	88.00%	+	78.00%
A	94.00%	B	84.00%	C	74.00%
-	90.00%	-	80.00%	-	70.00%
				D	64.00%
				F	<60.0%
				-	60.00%

## Campus policies:

Please visit <http://apps.gradschool.umd.edu/Catalog/policy.php?the-academic-record> for the Graduate School's full list of campus-wide policies and follow up with me if you have questions.

## **Make-up Exams/Assignments**

If you are aware ahead of time that you will be absent on the day of an exam, you may schedule a make-up exam provided that (1) you have an approved University Acceptance (e.g., religious observance) and (2) I am notified in writing within the first two weeks of the semester. Assignments are expected to be submitted by the dates indicated on the syllabus or in advance of the due date if you anticipate being absent from class on the due date. You should inform me that you will be absent ahead of time to make arrangements to submit the assignment.

When the reason for an absence on the day of an exam or assignment is not foreseeable, you must inform me as soon as possible. Please make every effort to contact me by phone or by email prior to class if you will be absent due to illness or other emergency. Campus Senate policy requires students who are absent due to illness/injury to furnish documentary support to the instructor. You must provide written documentation verifying your illness/injury on the day that you return to class. You will not be allowed to turn in missed assignments or make up exams if you have not provided this documentation. In addition, if it is found that you have falsified the documentation provided, you will be referred to the University's Student Conduct Office.

Make-up exams will be scheduled at a time that is mutually agreeable to both the instructor and the student. Assignments are due immediately by electronic submission if possible or upon the student's return to school. All missed exams and assignments not turned in will result in a grade of zero for that exam/assignment.

## **Problems/Questions**

Please do not hesitate to make an appointment to speak with me if you are having difficulty with the material or with an assignment, if you have questions about how something was graded, or if you have other problems or issues related to the course you wish to discuss. Email is an excellent way to reach me outside of course meetings.

## **Names/Pronouns and Self Identifications**

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). The pronouns someone indicates are not necessarily indicative of their gender identity. Visit [trans.umd.edu](https://trans.umd.edu) to learn more.

Additionally, how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity, is your choice whether to disclose (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps.

## Get Some Help!

You are expected to take personal responsibility for your own learning. This includes acknowledging when your performance does not match your goals and doing something about it. Everyone can benefit from some expert guidance on time management, note taking, and exam preparation, so I encourage you to consider visiting <http://ter.ps/learn> and schedule an appointment with an academic coach. Sharpen your communication skills (and improve your grade) by visiting <http://ter.ps/writing> and schedule an appointment with the campus Writing Center. Finally, if you just need someone to talk to, visit <http://www.counseling.umd.edu>.



Everything is free because you have already paid for it, and **everyone needs help**... all you have to do is ask for it.