Course Syllabus

Industrial and environmental noise problems

HESP 710
Fall 2018

Instructor:	Samira Anderson, Au.D., Ph.D.	Email: sander22@umd.edu
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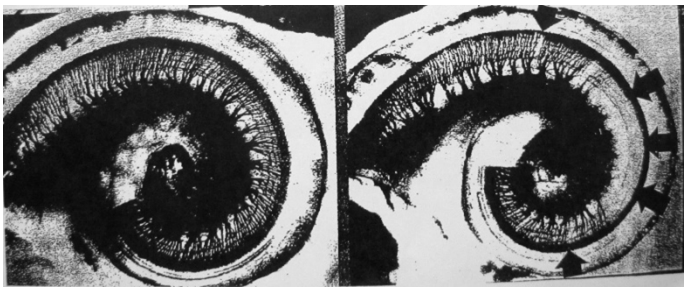
Dept. Phone:	301-405-4213	Office Hours: by appointment

Meeting Time:	Tuesdays, 5:00 – 7:30 PM
Meeting Location:	Lefrak Hall, Room 1222

This is your ear *This is your ear on noise*



Learner Outcomes*

Students will acquire knowledge in noise control, hearing conservation, industrial audiology, occupational audiology, and fitness-for-duty evaluation. After completing this course, you will be able to:

1. Describe the effects of noise on peripheral and central auditory function.
2. Measure and quantify noise levels and noise dose and provide recommendations for an appropriate hearing conservation program.
3. Evaluate, diagnose, and allocate hearing loss to noise, aging, and ototoxic exposures.
4. Counsel patients regarding effects of occupational and recreational noise exposure.
5. Describe the evidence that supports pharmacological and other methods to prevent noise-induced hearing loss.

Each student's knowledge and skills in these areas will be determined by the following assessment procedures:

1. Written examinations (one mid-term examination and one final examination).
2. Media presentations
3. Noise measurement project
4. Attendance and participation in class and in-class worksheets

*See p. 8 for the Audiology Knowledge and Skills addressed by specific learning outcomes

REQUIRED READINGS

Required Texts:

Dobie. R. (2015). *Medical-Legal Evaluation of Hearing Loss.* San Diego: Plural Publishing.

Course Schedule

Module 1 – History and Physiology	
August 28	Introduction; Class expectations; Public health significance of noise-induced hearing loss Historical outline of hearing conservation and noise control
In-class activities	Lecture In-class worksheet
Outside activities	Readings: 1. Dobie, Text, Chapters 5 and 9 2. Kerr, M. J., Neitzel, R. L., Hong, O., Sataloff, R. T. (2017). Historical review of efforts to reduce noise-induced hearing loss in the United States. Am J Ind Med, 60, 569-577.
September 4	Noise-induced damage to the cochlea
In-class activities	Kahoot! Lecture Media presentation
Outside activities	Readings: 1. Dobie, Text, Chapter 7 2. Kurabi, A., Keithley, E. M., Housley, G. D., Ryan, A. F., Wong, A. C. Y. (2017). Cellular mechanisms of noise-induced hearing loss. Hear Res, 349, 129-137.
September 11	Noise-induced damage to the central auditory system Early noise exposure effects and age-related hearing loss
In-class activities	Kahoot! Lecture Media presentation
Outside activities	Readings: 1. Kujawa, S. G., & Liberman, M. C. (2009). Adding Insult to Injury: Cochlear Nerve Degeneration after "Temporary" Noise-Induced Hearing Loss. *J Neurosci* 29(45), 14077-14085. 2. Kujawa, S. G., & Liberman, M. C. (2006). Acceleration of age-related hearing loss by early noise exposure: evidence of a misspent youth. *J Neurosci, 26*(7), 2115-2123. 3. Pienkowski, M., & Eggermont, J. J. (2009). Long-term, partially-reversible reorganization of frequency tuning in mature cat primary auditory cortex can be induced by passive exposure to moderate-level sounds. *Hear Res*, 257(1-2), 24-40.

Module 2 – Noise Measurement	
September 24	Noise measurement and instrumentation Risk assessment
In-class activities	Kahoot! Lecture In-class worksheet Demonstration of sound level meter and dosimeter measurements
Outside activities	Readings: 1. Qui, W., Hamernik, R. P., Davis, R. I. (2013). The value of a kurtosis metric in estimating the hazard to hearing of complex industrial noise exposures. J Acoust Soc Am, 133, 2856-2866. 2. Venet, T., Campo, P., Rumeau, C., Thomas, A., & Parietti-Winkler, C. (2014). One-day measurement to assess the auditory risks encountered by noise-exposed workers. Int J Audiol, 53(10), 737-744.
October 2	Noise regulations
In-class activities	Kahoot! Lecture In-class worksheet Review noise survey sites
Outside activities	Readings: 1. NIOSH criteria for a recommended standard 2. MSHA Federal Register 3. Federal Railroad Administration 4. https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=97359735
October 9	Noise control and hearing protection devices
In-class activities	Kahoot! Lecture In-class worksheet
Outside activities	Readings: 1. Biabani, A., Aliabadi, M., Golmohammadi, R., & Farhadian, M. (2017). Individual Fit Testing of Hearing Protection Devices Based on Microphone in Real Ear. Safety and Health at Work, 8(4), 364-370. 2. Brown, A. D., Beemer, B. T., Greene, N. T., Argo, T. t., Meegan, G. D., & Tollin, D. J. (2015). Effects of Active and Passive Hearing Protection Devices on Sound Source Localization, Speech Recognition, and Tone Detection. PLoS One, 10(8), e0136568 3. Earlogs 1-21 MIDTERM posted: Due 10/17/2017
Module 2 – Special Populations	
October 16	Music-Induced Hearing Loss and Non-Occupational Hearing Loss
In-class activities	Kahoot! Lecture In-class worksheet
Outside activities	Readings: 1. Dobie, Text, Chapter 8 2. Halevi-Katz, D. N., Yaakobi, E., & Putter-Katz, H. (2015). Exposure to music and noise-induced hearing loss (NIHL) among professional pop/rock/jazz musicians. *Noise Health, 17*(76), 158-164. 3. Schmidt, J. H., Pedersen, E. R., Paarup, H. M., Christensen-Dalsgaard, J., Andersen, T., Poulsen, T., & Baelum, J. (2014). Hearing loss in relation to sound

	exposure of professional symphony orchestra musicians. *Ear Hear,* 35(4), 448-460. 4. Taljaard, D. S., Leishman, N. F., & Eikelboom, R. H. (2013). Personal listening devices and the prevention of noise induced hearing loss in children: the Cheers for Ears Pilot Program. *Noise Health, 15*(65), 261-268
October 23	Synergistic effects of noise and other agents Susceptibility to NIHL
In-class activities	Kahoot! Lecture Media Presentation
Outside activities	Readings: 1. Dobie, Text, Chapter 7, pp 157-163 2. Boettcher, F. A., Henderson, D., Gratton, M. A., Danielson, R. W., & Byrne, C. D. (1987). Synergistic interactions of noise and other ototraumatic agents. Ear Hear, 8(4), 192-212. 3. DeBacker, J. R., Harrison, R. T., & Bielefeld, E. C. (2017). Long-Term Synergistic Interaction of Cisplatin- and Noise-Induced Hearing Losses. Ear and Hearing, 38(3), 4. Sliwinska-Kowalska, M., & Pawelczyk, M. (2013). Contribution of genetic factors to noise-induced hearing loss: a human studies review. Mutat Res, 752(1), 61-65. 5. Vlajkovic, S. M., Ambepitiya, K., Barclay, M., Boison, D., Housley, G. D., & Thorne, P. R. (2017). Adenosine receptors regulate susceptibility to noise-induced neural injury in the mouse cochlea and hearing loss. Hearing Research, 345, 43-51
October 30	Therapeutic agents to prevent NIHL
In-class activities	Kahoot! Lecture Media presentation
Outside activities	Readings: 1. Harris, K. C., Bielefeld, E., Hu, B. H., & Henderson, D. (2006). Increased resistance to free radical damage induced by low-level sound conditioning. *Hear Res*, 213(1-2), 118-129. 2. Claussen, A. D., Fox, D. J., Yu, X. C., Meech, R. P., Verhulst, S. J., Hargrove, T. L., & Campbell, K. C. (2013). D-methionine pre-loading reduces both noise-induced permanent threshold shift and outer hair cell loss in the chinchilla. *Int J Audiol*, 52(12), 801-807. 3. Kil, J., Lobarinas, E., Spankovich, C., Griffiths, S. K., Antonelli, P. J., Lynch, E. D., & Le Prell, C. G. (2017). Safety and efficacy of ebselen for the prevention of noise-induced hearing loss: a randomised, double-blind, placebo-controlled, phase 2 trial. Lancet, 390(10098), 969-979.
Module 3 – Legal Aspects of Hearing Conservation	
November 6	Diagnosis and Allocation
In-class activities	Kahoot! Lecture In-class worksheet
Outside activities	Readings: 1. Dobie, Text, Chapter 13
November 13	Auditory Fitness for Duty
In-class activities	Lecture
Outside activities	Readings: 1. Semeraro, H. D., Bevis, Z. L., Rowan, D., van Besouw, R. M., & Allsopp, A. J. (2015). Fit for the frontline? Identification of mission-critical auditory tasks (MCATs) carried out by infantry and combat-support personnel. Noise Health, 17(75), 98-107.

	2. Tufts, J. B., Vasil, K. A., & Briggs, S. (2009). Auditory fitness for duty: a review. J Am Acad Audiol, 20(9), 539-557. On-Line Quiz
November 20	Audiologist as Expert Witness; Reporting
In-class activities	Kahoot! Lecture In-class worksheet Media presentation
Outside activities	Readings: 1. Dobie, Text, Chapters 14 and 15
Module 4 – Military Audiology	
November 27	Noise-induced hearing loss and the military; Blast injury
In-class activities	Lecture HPD demo
Outside activities	Readings: 1. Dougherty, A., MacGregor, A. J., Han, P. P., Viirre, E., Heltemes, K. J., & Galarneau, M. R. (2013). Blast-related ear injuries among U.S. military personnel. *J Rehab Res Dev*, 50(6), 893-904. 2. , F. J., Lewis, M. S., Folmer, R. L., Diedesch, A. C., Kubli, L. R., McDermott, D. J., Walden, T. C., Fausti, S. A., Lew, H. L., & Leek, M. R. (2012). Implications of blast exposure for central auditory function: A review. *J Rehab Res Dev*, 49(7), 1059-1074.
December 4	Noise surveys
In-class activities	Kahoot! Noise survey presentations
December 11	**Final posted**
December 18	**Final due**

Learning Assessments	#	Points Each	Category Total	Category Weight
Worksheets	8	10	80	20%
Media presentations	1	20	20	5%
Noise Survey	1	50	50	13%
Midterm	1	120	120	31%
Final	1	120	120	31%
		Total Points:	**440**	

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Final Grade Cutoffs									
+	98.00%	+	88.00%	+	78.00%	+	68.00%		
A	94.00%	B	84.00%	C	74.00%	D	64.00%	F	<60.0%
-	90.00%	-	80.00%	-	70.00%	-	60.00%		

Noise Measurement Project

Select an area or operation and perform a noise survey. You may choose to do the measurement with up to one partner. Measure environmental noise using both a sound level meter and a noise dosimeter. Use the sound level meter to establish hazard radius; use the dosimeter to determine dose and whether or not the exposure rises to the level of OSHA's PEL. The area or operation must *potentially* be noise hazardous. After gathering relevant data, each student will make a powerpoint presentation and make recommendations based on the results, *as if you were presenting the findings to a plant manager.*

Suggestions include, but are not limited to:

Newspaper press room
Bottling Plant
Military Ordnance Test Center
Airport
Recreational setting such as Dave & Busters
Bakery
Military Air Station (Andrews AFB or Patuxent River)
Local Firing Range
Motocross or Drag Race
Mining operation
Wood working or furniture making operation
Construction Site
Landscaping operation
Metro subway system
Concert venue
Local bar or restaurant

Suggested Report Format:

Background – Overall description of the site and the noise sources you observed.
Methodology – Describe IN DETAIL what you did: instrumentation used, procedures followed, how equipment was programmed; Keep a time log of what happened when so you can refer to it in your discussion.
Data - What you found: include relevant graphs, charts, and important data such as peak, TWA or LAVG (dBA and dBC), noise dose
Analysis – Your interpretation of what the data means
Recommendations and Conclusions – What you would recommend in terms of noise control, hearing protection, avoidance measures, etc. if someone were to work or play in this environment

Sites must be selected and presented for feedback by **September 25, 2018.** You will present a powerpoint of your findings on the last day of class on **December 4, 2018**. Design your powerpoint as if you were presenting it to the company plant manager. Dr. Gordon-Salant is providing three dosimeters for this project. Please check these out on the class google doc and on the sign-out sheet in her cabinet.

Campus Policies

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, which include topics like:

- Academic integrity
- Student and instructor conduct

- Accessibility and accommodations
- Attendance and excused absences
- Grades and appeals
- Copyright and intellectual property

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 anticipates 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.

Get Some Help!

You are expected to take personal responsibility for you 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.

Audiology Knowledge and Skills addressed by specific learning outcomes:

3.1.2A FOUNDATIONS OF AUDIOLOGY PRACTICE

- Effects and role of genetics in auditory function, diagnosis, and management of hearing loss (Outcomes 1 and 3)
- Effects of chemicals and other noxious elements on auditory and vestibular function (Outcomes 1 and 3)
- Effects of pathophysiology on the auditory, vestibular, and related body systems (Outcomes 1 and 3)
- Physical characteristics and measurement of simple and complex acoustic stimuli (Outcome 2)
- Principles of psychoacoustics as related to auditory perception in individuals with normal hearing and those with hearing loss (Outcome 3)

3.1.3A IDENTIFICATION AND PREVENTION OF HEARING LOSS, TINNITUS, AND VESTIBULAR DISORDERS

- Administering programs designed to reduce the effects of noise exposure, tinnitus, and agents that are toxic to the auditory and vestibular systems (Outcomes 2 and 4)
- Applying psychometrics and principles of screening (Outcomes 2 and 4)
- Selection and use of outcomes measures that are valid and reliable indicators of success of prevention programs (Outcomes 2 to 4)

3.1.4A ASSESSMENT OF THE STRUCTURE AND FUNCTION OF THE AUDITORY AND VESTIBULAR SYSTEMS

- Evaluate information from appropriate sources to facilitate assessment planning (Outcome 2)
- Obtain a case history (Outcomes 3 and 4)
- Provide counseling in a culturally sensitive manner to facilitate understanding of the hearing loss, tinnitus, or balance disorder of the individual being served (Outcome 4)
- Communicate results and recommendations orally and in writing to the individual being served and other appropriate individual(s) (Outcomes 2, 3, and 4)
- Apply the principles of evidence-based practice (Outcomes 3, 4, and 5)
- Select and use outcomes measures that are valid and reliable indicators of success in assessment protocols that are used (Outcomes 3, 4, and 5)

3.1.5A ASSESSMENT OF THE IMPACT OF CHANGES IN THE STRUCTURE AND FUNCTION OF THE AUDITORY AND VESTIBULAR SYSTEMS

- Administer clinically appropriate and culturally sensitive self-assessment measures of communication function for individuals across the lifespan and the continuum of care

(Outcomes 3 and 4)

- Select and use outcomes measures that are valid and reliable indicators of success in determining the impact of changes in structure and function of the auditory and vestibular systems
  (Outcomes 3 and 5)

3.1.6A INTERVENTION TO MINIMIZE THE EFFECTS OF CHANGES IN THE AUDITORY AND VESTIBULAR SYSTEMS ON AN INDIVIDUAL'S ABILITY TO PARTICIPATE IN HIS OR HER ENVIRONMENT

- Serve as an advocate for individuals served, their families, and other appropriate individuals
  (Outcomes 3, 4, and 5)
- Apply the principles of evidence-based practice
  (Outcomes 3, 4, and 5)
- Document treatment procedures and results
  (Outcomes 4 and 5)
- Communicate results, recommendations, and progress in a culturally sensitive and age-appropriate manner to appropriate individual(s)
  (Outcome 4)
- Select and use outcomes measures that are valid and reliable indicators of success in determining the impact of the interventions used to minimize the effects of changes in structure and function of the auditory and vestibular systems
  (Outcome 2, 3, and 5)