



Learning Outcomes

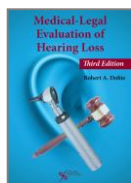
Students will acquire knowledge in noise control, hearing conservation, industrial audiology, occupational audiology, and fitness-for-duty evaluation.

After successful completion of this course you will be able to:

- Describe the effects of noise on peripheral and central auditory function.
- Measure and quantify noise levels and noise dose and provide recommendations for an appropriate hearing conservation program.
- Evaluate, diagnose, and allocate loss to noise, aging, and ototoxic exposures.
- Counsel patients on occupational and recreational noise exposure.
- Describe the evidence that supports pharmacological and other methods to prevent noise-induced hearing loss.
- *See Knowledge and Skills below for a complete list of learning outcomes.*

Resources

Course website: elms.umd.edu



Medical-Legal Evaluation of Hearing Loss **Required**
Dobie, R.
Third edition (2015).
ISBN: [978-1-59756-714-5](http://www.amazon.com/dp/9781597567145)

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. These policies are superseded by this document, your CAUD handbook, and any relevant policies of the Department of the Hearing and Speech, and the College of Behavioral and Social Sciences.

Activities, Learning Assessments, & Expectations for Students

The format of the course is a combination of lecture and discussion. PowerPoint slides will be available on ELMS prior to each meeting. The course content is a combination of material from the required text and additional sources available through the University of Maryland library or the course website.

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Class Meets

Mondays
5:00pm - 7:30pm
LeFrak Hall 0104

Office Hours

LeFrak Hall 0119E
Wednesdays
3:00pm – 5:00pm
and by appointment

Course Communication

Subscribe to course announcements via ELMS. Students may contact the instructor via ELMS or email to discuss questions, absences, or accommodations.

Prior to each class meeting, students are strongly encouraged to read the material listed on the course calendar prior to that meeting. Kahoots-based quizzes will be administered throughout the course to evaluate knowledge, encourage reading, promote learning through recall, and to provide a mechanism for communicating expectations.

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 must make a 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 an arcade
- Bakery or food service manufacturing
- Military air base (Andrews AFB or Patuxent River)
- Local firing range
- Auto or motorcycle race, monster truck show
- Mining operation
- Wood-working or furniture manufacturing shop
- Construction site
- Landscaping operation
- Metro subway system
- Concert venue or night club
- Machine shop

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 the data in terms of potential hazard, need for a HCP

Recommendations and Conclusions – What you would recommend for noise control, hearing protection, avoidance measures, communication, etc. for people exposed to this environment

Sites must be selected and presented for feedback by **September 23, 2019**. You will present your results and recommendations on **December 2, 2019**. Dr. Gordon-Salant is providing three dosimeters for this project. Please reserve these out on the class google doc and check them out using the sign-out sheet in her cabinet.

Exams

Two take-home exams will be administered on the dates listed on the calendar. Each exam will focus on the material covered since the previous exam, but they will be considered “comprehensive” and may contain content from the entirety of the course. The exams will include material from the assigned readings, lectures, and in-class activities. Each exam will be given one week prior to the due date and must be submitted via ELMS on time.

Course-Specific Policies

Students are expected to maintain a high level of respect for the instructor and fellow classmates. Please refrain from all non-essential activities during class including visiting websites for news, social media, shopping, or searching for information that is not directly related to the current course discussion. Attendance is expected for the entirety of each course meeting. Accommodations will be made for excused absences. Please inform me of an excused absence in a timely manner so we can make an appropriate plan.

Grades

Grades are not given, but earned. Your grade is determined by performance on the learning assessments in the course and is assigned individually (not curved). If earning a particular grade is important to you, please speak with the instructor early and often for helpful suggestions for achieving your goal. All assessment scores will be posted on the course ELMS page. If you would like to review any grades (including the exams), or have questions about how something was scored, please schedule a time to meet. Late work will not be accepted for course credit except where specified above. Formal grade disputes must be submitted in writing within one week of receiving the grade.

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

Final letter grades are assigned based on the percentage of total assessment points earned.

Final Grade Cutoffs					
+	97.0%	+	87.0%	+	77.0%
		+	67.0%		
A	94.0%	B	84.0%	C	74.0%
		D	64.0%	F	<60.0%
-	90.0%	-	80.0%	-	70.0%
		-	60.0%		

Course Schedule

Module 1 - History and Physiology	
August 26	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 assignment
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 9	Noise-induced damage to the cochlea
In-class activities	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. <i>Hear Res</i> , 349, 129-137.
September 16	Noise-induced damage to the central auditory system Early noise exposure effects and age-related hearing loss
In-class activities	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. <i>J Neurosci</i> 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. <i>J Neurosci</i> , 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. <i>Hear Res</i> , 257(1-2), 24-40.
Module 2 – Noise Measurement	
September 23	Noise measurement and instrumentation Risk assessment
In-class activities	Lecture In-class assignment 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. <i>J Acoust Soc Am</i> , 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. <i>Int J Audiol</i> , 53(10), 737-744.
September 30	Noise regulations
In-class activities	Lecture In-class assignment 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 7	Noise control and hearing protection devices
In-class activities	Lecture In-class assignment
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. <i>Safety and Health at Work</i> , 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. <i>PLoS One</i> , 10(8), e0136568 3. Earlogs 1-21 MIDTERM posted: Due 10/17/2017
Module 3 – Special Populations	
October 14	Music-Induced Hearing Loss and Non-Occupational Hearing Loss

In-class activities	Lecture In-class assignment
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. <i>Noise Health</i> , 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. <i>Ear Hear</i> , 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. <i>Noise Health</i> , 15(65), 261-268
October 21	Synergistic effects of noise and other agents Susceptibility to NIHL
In-class activities	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. <i>Ear Hear</i> , 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. <i>Ear and Hearing</i> , 38(3), 4. Sliwiska-Kowalska, M., & Pawelczyk, M. (2013). Contribution of genetic factors to noise-induced hearing loss: a human studies review. <i>Mutat Res</i> , 752(1), 61-65. 5. Vljakovic, 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. <i>Hearing Research</i> , 345, 43-51
October 28	Therapeutic agents to prevent NIHL
In-class activities	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. <i>Hear Res</i> , 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. <i>Int J Audiol</i> , 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. <i>Lancet</i> , 390(10098), 969-979.
Module 4 – Legal Aspects of Hearing Conservation	
November 4	Diagnosis and Allocation
In-class activities	Lecture In-class assignment
Outside activities	Readings: 1. Dobie, Text, Chapter 13
November 11	Auditory Fitness for Duty
In-class activities	Lecture
Outside activities	On-Line Quiz 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. <i>Noise Health</i> , 17(75), 98-107.

	2. Tufts, J. B., Vasil, K. A., & Briggs, S. (2009). Auditory fitness for duty: a review. <i>J Am Acad Audiol</i> , 20(9), 539-557.
November 18	Audiologist as Expert Witness; Reporting
In-class activities	Lecture In-class assignment Media presentation
Outside activities	Readings: 1. Dobie, Text, Chapters 14 and 15
Module 5 – Military Audiology	
November 25	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. <i>J Rehab Res Dev</i> , 50(6), 893-904. 2. Gallun, 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. <i>J Rehab Res Dev</i> , 49(7), 1059-1074.
December 2	Noise surveys
In-class activities	Noise survey presentations
December 9	Topic – To be determined
In-class activities	Guest Lecture – To be determined
Outside activities	Final posted
Final Exam Date TBD	Final due

Note: This is a tentative schedule, and subject to change as necessary – monitor the course ELMS page for current deadlines. Details about chapter sections assigned to ‘a’ and ‘b’ and additional readings will be provided. Additional recommended readings will be posted to the course ELMS page. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.

Knowledge and Skills for Audiology (KASA)

Standard II-A: Foundations of Practice

A1. Genetics, embryology and development of the auditory and vestibular systems, anatomy and physiology, neuroanatomy and neurophysiology, and pathophysiology of hearing and balance over the life span

A2. Effects of pathogens, and pharmacologic and teratogenic agents, on the auditory and vestibular systems

A7. Applications and limitations of specific audiologic assessments and interventions in the context of overall client/patient management

A9. Implications of biopsychosocial factors in the experience of and adjustment to auditory disorders and other chronic health conditions

A10. Effects of hearing impairment on educational, vocational, social, and psychological function throughout the life span

- A12. Effective interaction and communication with clients/patients, families, professionals, and other individuals through written, spoken, and nonverbal communication
- A13. Principles of research and the application of evidence-based practice (i.e., scientific evidence, clinical expertise, and client/patient perspectives) for accurate and effective clinical decision making
- A14. Assessment of diagnostic efficiency and treatment efficacy through the use of quantitative data (e.g., number of tests, standardized test results) and qualitative data (e.g., standardized outcome measures, client/patient-reported measures)
- A17. Importance, value, and role of interprofessional communication and practice in patient care
- A18. The role, scope of practice, and responsibilities of audiologists and other related professionals
- A20. Management and business practices, including but not limited to cost analysis, budgeting, coding, billing and reimbursement, and patient management
- A21. Advocacy for individual patient needs and for legislation beneficial to the profession and the individuals served
- A22. Legal and ethical practices, including standards for professional conduct, patient rights, confidentiality, credentialing, and legislative and regulatory mandates
- A23. Principles and practices of effective supervision/mentoring of students, other professionals, and support personnel

Standard II-B: Prevention and Screening

- B1. Educating the public and those at risk on prevention, potential causes, effects, and treatment of congenital and acquired auditory and vestibular disorders
- B2. Establishing relationships with professionals and community groups to promote hearing wellness for all individuals across the life span
- B3. Participating in programs designed to reduce the effects of noise exposure and agents that are toxic to the auditory and vestibular systems
- B4. Utilizing instrument(s) (i.e. sound-level meter, dosimeter, etc.) to determine ambient noise levels and providing strategies for reducing noise and reverberation time in educational, occupational, and other settings
- B5. Recognizing a concern on the part of medical providers, individuals, caregivers, or other professionals about hearing and/or speech-language problems and/or identifying people at risk to determine a need for hearing screening
- B6. Conducting hearing screenings in accordance with established federal and state legislative and regulatory requirements
- B7. Participating in occupational hearing conservation programs
- B8. Performing developmentally, culturally, and linguistically appropriate hearing screening procedures across the life span
- B9. Referring persons who fail the hearing screening for appropriate audiologic/medical evaluation
- B14. Evaluating the success of screening and prevention programs through the use of performance measures (i.e., test sensitivity, specificity, and positive predictive value)

Standard II-C: Audiologic Evaluation

- C1. Gathering, reviewing, and evaluating information from referral sources to facilitate assessment, planning, and identification of potential etiologic factors
- C5. Providing assessments of tinnitus severity and its impact on patients' activities of daily living and quality of life
- C6. Providing assessment of tolerance problems to determine the presence of hyperacusis
- C8. Selecting, performing, and interpreting developmentally appropriate behavioral pure-tone air and bone tests, including extended frequency range when indicated
- C13. Selecting, performing, and interpreting tests for nonorganic hearing loss

Standard II-D: Counseling

- D1. Identifying the counseling needs of individuals with hearing impairment based on their narratives and results of client/patient and/or caregiver responses to questionnaires and validation measures
- D2. Providing individual, family, and group counseling as needed based on client/patient and clinical population needs

D7. Promoting clients'/patients' self-efficacy beliefs and promoting self-management of communication and related adjustment problems

D8. Enhancing adherence to treatment plans and optimizing treatment outcomes

D9. Monitoring and evaluating client/patient progress and modifying counseling goals and approaches, as needed

Standard II-E: Audiologic Rehabilitation Across the Life Span

E3. Responding empathically to clients'/patients' and their families' concerns regarding communication and adjustment difficulties to establish a trusting therapeutic relationship

E5. Identifying the effects of hearing problems and subsequent communication difficulties on marital dyads, family dynamics, and other interpersonal communication functioning

E22. Counseling clients'/patients' regarding the audiologic significance of tinnitus and factors that cause or exacerbate tinnitus to resolve misconceptions and alleviate anxiety related to this auditory disorder

Standard II-F: Pediatric Audiologic (Re)habilitation

N/A