



UNIVERSITY OF
MARYLAND

Course Information

Course Title: Cochlear Implants & Other Implantable Technologies

Course Number: HESP 712

Term: Fall 2025

Credits: 3

Course Dates: From Sept 8, 2025 – Dec 15, 2025

Course Times: Mondays 2:30-5:00 PM

Instructors:

Nicole Nguyen, Au.D., CISC, CCC-A

Matt Goupell, Ph.D.

Email: nknguyen@umd.edu/goupell@umd.edu

Office Hours: by appointment (F2F/Zoom)

Classroom: LeFrak 0135

Course Description

This course is designed to provide students with the most up-to-date approaches to working with implantable devices used in hearing (re)habilitation. Students will learn about the design and processing, medical/surgical aspects, evaluation, programming, outcomes associated with cochlear implants, bone-conduction implants, middle ear implants, and auditory brainstem implants. Students will be able to apply evidence-based approaches to clinical practice with these devices for patients of all ages. An integral part of clinical care with medical devices is a team approach to candidacy assessment, intervention, and (re)habilitation, therefore much time will be spent discussing Interprofessional Practice and the many roles the audiologist may play in the hearing rehabilitation team.

Course Objectives

Upon completion of this course, the student will have knowledge and skills necessary to:

1. Be able to articulate both pediatric and adult cochlear implant candidacy criteria and identify best methods for assessment of candidacy; be able to provide rationale for selected assessments and candidacy criteria; be able to assess and determine candidacy criteria as part of an interdisciplinary cochlear implant team.
2. Be familiar with general implant surgical techniques and procedures; be able to identify risks and benefits of cochlear implant surgery and post-surgical medical management of cochlear implants.
3. Work within an interdisciplinary team to make decisions regarding patient candidacy and treatment options and as well as coordinate patient care during rehabilitation.
4. Be able to describe the process of converting an acoustic speech signal into electrical signals and how this transformation happens in a cochlear implant; advantages and disadvantages of speech coding in cochlear implants; perceptual effects of electrical stimulation; how different speech processing strategies work.
5. Be able to identify basic mapping procedures and speech processor management; be familiar with advanced mapping techniques and speech processor parameters.
6. Describe the outcomes of cochlear implantation in adults and children.

Required Resources

- Course Website: <http://www.elms.umd.edu/>
- Book: Wolfe, J. Cochlear Implants – Audiologic Management and Considerations for Implantable Devices; First Edition, San Diego: Plural Publishing, 2020. (ISBN: 1597568929)
- Supplemental readings: posted in ELMS

Course Structure

This course will be presented primarily face-to-face with some lectures presented via a flipped course design. For some topics, students will watch recorded lectures and complete assigned readings prior to

the face-to-face meeting each week. “In-class” time will focus on discussion, application, and integration of course material facilitated by the instructor.

Tips for Success with Online Course Activities

1. **Participate.** Discussions and group work are a critical part of the course. You can learn a great deal from discussing ideas and perspectives with your peers and professor. Participation can also help you articulate your thoughts and develop critical thinking skills.
2. **Manage your time.** Make time for your online learning and participation in discussions each week. Give yourself plenty of time to complete assignments including extra time to handle any technology related problems.
3. **Login regularly.** Log in to ELMS-Canvas several times a week to view announcements, discussion posts and replies to your posts. You may need to log in multiple times a day when group submissions are due.
4. **Do not fall behind.** This class moves at a quick pace and each week builds on the previous. It will be hard to keep up with the course content if you fall behind in the pre-work or post-work.
5. **Use ELMS-Canvas notification settings.** Canvas ELMS-Canvas can ensure you receive timely notifications in your email or via text. Be sure to enable announcements to be sent instantly or daily.
6. **Ask for help if needed.** If you need help with ELMS-Canvas or other technology, IT Support. If you are struggling with a course concept, reach out to me, and your classmates, for support.

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 <https://gradschool.umd.edu/course-related-policies> for The Graduate School’s full list of campus-wide policies and follow up with us if you have questions.

Course Guidelines

Academic Integrity

For this course, some of your assignments will be collected via Turnitin on our course ELMS page. We have chosen to use this tool because it can help you improve your scholarly writing and help us verify the integrity of student work. For information about Turnitin, how it works, and the feedback reports you may have access to, visit [Turnitin Originality Checker for Students](#)

Names/Pronouns and Self-Identifications

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. We 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 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. We will do our best to address and refer to all students accordingly, and we ask you to do the same for all of your fellow Terps.

Communication with Instructor:

Email: If you need to reach out and communicate with us, please email at nknguyen@umd.edu and goupell@umd.edu. Please DO NOT email us with questions that are easily found in the syllabus or on ELMS (i.e. When is this assignment due? How much is it worth? etc.) but please DO reach out about personal, academic, and intellectual concerns/questions.

While we will do our best to respond to emails within 24 hours, you will more likely receive email responses from us on Mondays, Wednesdays, and Fridays from 12:00-4:00pm.

ELMS: We will send IMPORTANT announcements via ELMS messaging. You must make sure that your email & announcement notifications (including changes in assignments and/or due dates) are enabled in ELMS so you do not miss any messages. You are responsible for checking your email and Canvas/ELMS inbox with regular frequency.

Communication with Peers:

With a diversity of perspectives and experience, we may find ourselves in disagreement and/or debate with one another. As such, it is important that we agree to conduct ourselves in a professional manner and that we work together to foster and preserve a virtual classroom environment in which we can respectfully discuss and deliberate controversial questions.

We encourage you to confidently exercise your right to free speech—bearing in mind, of course, that you will be expected to craft and defend arguments that support your position. Keep in mind, that free speech has its limit and this course is NOT the space for hate speech, harassment, and derogatory language. We will make every reasonable attempt to create an atmosphere in which each student feels comfortable voicing their argument without fear of being personally attacked, mocked, demeaned, or devalued.

Any behavior (including harassment, sexual harassment, and racially and/or culturally derogatory language) that threatens this atmosphere will not be tolerated. Please alert us immediately if you feel threatened, dismissed, or silenced at any point during our semester together and/or if your engagement in discussion has been in some way hindered by the learning environment.

Learning Checks & Major Assignments

Assignments & Presentations

- Students will be required to complete manufacturer-guided trainings for current implant systems. These modules will include topics related to candidacy, clinical decision making, device features, fitting and programming.
- Students will be required to complete thoughtful reflections to demonstrate learning from these sessions – including evidence-based practice and real-world applications.
- Students will present on the use of implantable devices for special populations to demonstrate competency in providing patient and family centered care.

Discussion posts

- Students will respond to prompts on the discussion board for each topic in the course. Some weeks, there will be multiple discussion threads to respond to.
- Discussion posts are due the **Sunday** *before* class to allow time for review and response from the instructors.

Quizzes

- Quizzes will be administered via ELMS throughout the semester.
- The quizzes provide opportunities for students to demonstrate acquisition of significant details from the course lectures and readings.

Participation & Engagement

- Active participation is expected during synchronous meetings.
- Due to the flipped nature of the course, it is important that we can gauge how successful students are at learning and integrating the material. Active participation, whether synchronous or asynchronous, demonstrates engagement and effort in learning and applying the material.

Exams

- Students will complete two (2) exams during the semester.
- The purpose of the exams is to provide students with the opportunity to demonstrate the integration of knowledge they have gained in the weeks prior. Students will be able to apply the course content to practical questions that they may encounter in their future in the profession.
- The final exam will be due by 11:59 pm on **Monday, December 15th**.

Grading Structure

Assignment	Points	Percentage %
Assignments	220	35%
Quizzes*	300	5%
Discussion board posts	50	10%

Exams	200	50%
Total	770	100%

*total number of quiz points is subject to change

Academic Integrity

The University's [Code of Academic Integrity](#) is designed to ensure that the principles of academic honesty and integrity are upheld. In accordance with this code, the Department of Hearing & Speech Sciences does not tolerate academic dishonesty. Please ensure that you fully understand this code and its implications because all acts of academic dishonesty will be dealt with in accordance with the provisions of this code. All students are expected to adhere to this Code. It is your responsibility to read it and know what it says, so you can start your professional life on the right path. **As future professionals, your commitment to high ethical standards and honesty begins with your time in the HESP Department.**

It is important to note that course assistance websites are not permitted sources for information. Material taken or copied from these sites can be deemed unauthorized material and a violation of academic integrity. These sites offer information that might not be accurate and that shortcut the learning process, particularly the critical thinking steps necessary for graduate-level assignments.

Additionally, it is understandable that students may use a variety of online or virtual forums for course-wide discussion (e.g., GroupME or WeChat). Collaboration in this way regarding concepts discussed in this course is permissible. However, collaboration on graded assignments is strictly prohibited unless otherwise stated. Examples of prohibited collaboration include: asking classmates for answers on quizzes or exams, asking for literature citations, etc.

Finally, on each exam or assignment you must write out and sign the following pledge:

"I pledge on my honor that I have not given or received any unauthorized assistance on this exam/assignment."

Please visit [The Graduate School](#) for The Graduate School's full list of campus-wide policies and follow up with us if you have questions.

Grades

All assessment scores will be posted on the course ELMS page. If you would like to review any of your grades (including the exams), or have questions about how something was scored, please email us to schedule a time for us to meet and discuss.

Late work will not be accepted for course credit so please plan to have it submitted well before the scheduled deadline. We are happy to discuss any of your grades with you, and if we have made a mistake, we will immediately correct it. Any formal grade disputes must be submitted in writing and within one week of receiving the grade.

Final letter grades are assigned based on the percentage of total assessment points earned. To be fair to everyone we must establish clear standards and apply them consistently, so please understand that being close to a cutoff is not the same as making the cut (89.99 \neq 90.00). It would be unethical to make exceptions for some and not others.

Final Grade Cutoffs									
+	97.00%	+	87.00%	+	77.00%	+	67.00%	+	
A	94.00%	B	84.00%	C	74.00%	D	64.00%	F	<60.0%
-	90.00%	-	80.00%	-	70.00%	-	60.00%	-	

Course Schedule

Class #	Topic/Textbook Readings	
	Basic Science	Clinical Implications/Methods
1 9/8	Introduction to and history of cochlear implants Basic CI design Effects of deafness on auditory system Anatomy and Physiology associated with implantation	Cochlear implant candidacy & assessment (adults)
	Chapters 1 & 3	Chapters 4 & 5
2 9/15	Electrophysiologic measures related to cochlear implants (ECAPs)	Objective measures in programming NRT/NRI/ESRT
		Chapter 18
3 9/22	Physics and electronics of cochlear implantation	Implant programming
	Chapter 2	Chapters 7, 14, 15, 16, 17
4 9/29	Coding strategies	Disparities in candidacy referrals and access to care
	Chapter 8	
5 10/6	The role of imaging in implantable hearing devices	Medical and surgical aspects of cochlear implantation Vestibular assessment and management of CI users
	Chapter 13	Chapters 12 & 19
10/13	Fall Break	
6 10/20	Hearing with 2 ears! Bilateral, Bimodal, SSD	Combining electrical & acoustic hearing: Bimodal/Bilateral/SSD decision making Hybrid/EAS

		Chapters 20 & 24
7 10/27	Exam 1	
8 11/3	Image Based Mapping OTOPLAN	<i>Guest Lecture: Keithia Harding, Au.D. Med-El</i>
9 11/10	<i>Guest Lecture: Jen Mertes, Au.D. Advanced Bionics</i>	Before & After the Cochlea! MEIs and ABIs
		Chapters 25 & 28
10 11/17	Pitch, FSP, & Music	Rehabilitation, Realistic expectations Billing & Coding
		Chapters 21, 22, 23
11 11/24	Aging & Cognition	Candidacy, Programming and Support Resources for Aging Patients
12 12/1	Presentations: Special Populations	
13 12/8	Bone Conduction: Spatial Hearing & BC Devices	
	Chapters 26 & 27	
14 12/15	Final Exam Due by 11:59 pm	

Note: This is a tentative schedule, and subject to change as necessary – monitor the course ELMS page for current deadlines. 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.

Resources & Accommodations

Accessibility and Disability Services

The University of Maryland is committed to creating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is also committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The [**Accessibility & Disability Service \(ADS\)**](#) provides reasonable accommodations to qualified individuals to provide equal access to services, programs and activities. ADS cannot assist retroactively, so it is generally best to request accommodations several weeks before the semester begins or as soon as a disability becomes known.

Any student who needs accommodations should contact us as soon as possible so that we have sufficient time to make arrangements.

For assistance in obtaining an accommodation, contact Accessibility and Disability Service at 301-314-7682, or email them at adsfrontdesk@umd.edu. Information about [sharing your accommodations with instructors, note taking assistance](#) and more is available from the [Counseling Center](#).

Student Resources and Services

Taking personal responsibility for your own learning means acknowledging when your performance does not match your goals and doing something about it. We hope you will talk to us so that we can help you find the right approach to success in this course, and we encourage you to visit [UMD's Student Academic Support Services website](#) to learn more about the wide range of campus resources available to you.

In particular, everyone can use some help sharpening their communication skills (and improving their grade) by visiting [UMD's Writing Center](#) and schedule an appointment with the campus Writing Center.

You should also know there are a wide range of resources to support you with whatever you might need ([UMD's Student Resources and Services website](#) may help). If you feel it would be helpful to have someone to talk to, visit [UMD's Counseling Center](#) or [one of the many other mental health resources on campus](#).

Basic Needs Security

If you have difficulty affording groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live, please visit [UMD's Division of Student Affairs website](#) for information about resources the campus offers you and let us know if we can help in any way.

Technology Policy

Please refrain from using cellphones, laptops, and other electronic devices during face-to-face class sessions unless we have designated such use as part of a class exercise.

Netiquette Policy

Netiquette is the social code of online classes. Students share a responsibility for the course's learning environment. Creating a cohesive online learning community requires learners to support and assist each other. To craft an open and interactive online learning environment, communication has to be conducted in a professional and courteous manner at all times, guided by common sense, collegiality and basic rules of etiquette.

Participation

- Given the virtual nature of this course, online interaction will be crucial to actively participating. Class discussions will occur via ELMS and your participation in these discussions is important.
- Each student is expected to make substantive contributions to the learning experience, and attendance is expected for every synchronous session.
- Students with a legitimate reason to miss a live session should communicate in advance with the instructor, except in the case of an emergency.
- Students who miss a live session are responsible for learning what they miss from that session.
- Additionally, students must complete all readings and assignments in a timely manner in order to fully participate in class.

Course Evaluation

Please submit a course evaluation through CourseEvalUM in order to help faculty and administrators improve teaching and learning at Maryland. All information submitted to CourseEvalUM is confidential. Campus will notify you when CourseEvalUM is open for you to complete your evaluations for fall semester courses. Please go directly to the [Course Eval UM website](#) to complete your evaluations. By completing all of your evaluations each semester, you will have the privilege of accessing through Testudo, the evaluation reports for the thousands of courses for which 70% or more students submitted their evaluations.

Copyright Notice

Course materials are copyrighted and may not be reproduced for anything other than personal use without written permission.

Audiology Knowledge and Skills addressed by the learning outcomes in HESP 712:

II-A: FOUNDATIONS OF AUDIOLOGY 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
- A3. Language and speech characteristics and their development for individuals with normal and impaired hearing across the life span
- A4. Principles, methods, and applications of acoustics, psychoacoustics, and speech perception, with a focus on how each is impacted by hearing impairment throughout the life span
- 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
- A11. Manual and visual communication systems and the use of interpreters/transliterators/translators
- A12. Effective interaction and communication with clients/patients, families, professionals, and other individuals through written, spoken, and nonverbal communication
- 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

II-C: AUDIOLOGIC EVALUATION

- C1. Gathering, reviewing, and evaluating information from referral sources to facilitate assessment, planning, and identification of potential etiologic factors
- C2. Obtaining a case history and client/patient narrative
- C3. Obtaining client/patient-reported and/or caregiver-reported measures to assess function

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
- D4. Enhancing clients'/patients' acceptance of and adjustment to hearing aids, hearing assistive technologies, and

osseointegrated and other implantable devices

II-E: AUDIOLOGIC REHABILITATION ACROSS THE LIFE SPAN

E1. Engaging clients/patients in the identification of their specific communication and adjustment difficulties by eliciting client/patient narratives and interpreting their and/or caregiver-reported measures

E2. Identifying the need for, and providing for assessment of, concomitant cognitive/developmental concerns, sensory-perceptual and motor skills, and other health/medical conditions, as well as participating in interprofessional collaboration to provide comprehensive management and monitoring of all relevant issues

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

E4. Providing assessments of family members' perception of and reactions to communication difficulties

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

E6. Engaging clients/patients (including, as appropriate, school-aged children/adolescents) and family members in shared decision making regarding treatment goals and options

E7. Developing and implementing individualized intervention plans based on clients'/patients' preferences, abilities, communication needs and problems, and related adjustment difficulties

E14. Identifying individuals who are candidates for cochlear implantation and other implantable devices

E15. Counseling cochlear implant candidates and their families regarding the benefits and limitations of cochlear implants to (a) identify and resolve concerns and potential misconceptions and (b) facilitate decision making regarding treatment options

E16. Providing programming and fitting adjustments; providing postfitting counseling for cochlear implant clients/patients

E19. Ensuring compatibility of HATS when used in conjunction with hearing aids, cochlear implants, or other devices and in different use environments

E28. Ensuring treatment benefit and satisfaction by monitoring progress and assessing treatment outcome

II-F: PEDIATRIC AUDIOLOGIC (RE)HABILITATION

F1. Counseling parents to facilitate their acceptance of and adjustment to a child's diagnosis of hearing impairment

F2. Counseling parents to resolve their concerns and facilitate their decision making regarding early intervention, amplification, education, and related intervention options for children with hearing impairment

F3. Educating parents regarding the potential effects of hearing impairment on speech-language, cognitive, and social-emotional development and functioning

F4. Educating parents regarding optional and optimal modes of communication; educational laws and rights, including 504s, individualized education programs (IEPs), individual family service plans (IFSPs), individual health plans; and so forth

F7. Planning and implementing parent education/support programs concerning the management of hearing impairment and subsequent communication and adjustment difficulties

F8. Providing for intervention to ensure age/developmentally appropriate speech and language development

F9. Administering self-assessment, parental, and educational assessments to monitor treatment benefit and outcome

F10. Providing ongoing support for children by participating in IEP or IFSP processes

F11. Counseling the child with hearing impairment regarding peer pressure, stigma, and other issues related to psychosocial adjustment, behavioral coping strategies, and self-advocacy skills

F13. Providing interprofessional consultation and/or team management with speech-language pathologists, educators, and

other related professionals