

Term Information

Effective Term Summer 2024
Previous Value Summer 2012

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

Increase credit hours from 2 to 3

What is the rationale for the proposed change(s)?

New course will include content related to 1.) factors that contribute to outcomes in cochlear implant recipients and 2.) Provide the opportunity to troubleshoot and manage complex cochlear implant cases.

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course?)
none

Is approval of the request contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

General Information

Course Bulletin Listing/Subject Area Speech and Hearing Science
Fiscal Unit/Academic Org Speech & Hearing - D0799
College/Academic Group Arts and Sciences
Level/Career Graduate
Course Number/Catalog 8931
Course Title Cochlear Implants
Transcript Abbreviation Cochlear Implants
Course Description Cochlear implant components and functions. Patient candidacy, implant programming, and rehabilitation procedures.
Semester Credit Hours/Units Fixed: 3
Previous Value Fixed: 2

Offering Information

Length Of Course 14 Week
Previous Value 14 Week, 12 Week, 8 Week, 7 Week, 6 Week, 4 Week
Flexibly Scheduled Course Never
Does any section of this course have a distance education component? No
Grading Basis Letter Grade
Repeatable No
Course Components Lecture
Grade Roster Component Lecture
Credit Available by Exam No
Admission Condition Course No
Off Campus Never
Campus of Offering Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites	Prereq: Grad standing; or permission of instructor.
Exclusions	
Previous Value	Not open to students with credit for 930.01
Electronically Enforced	No

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code	51.0202
Subsidy Level	Doctoral Course
Intended Rank	Masters, Doctoral

Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

Course Details

Course goals or learning objectives/outcomes	<ul style="list-style-type: none">• Be able to define the components and functions of the cochlear implant• Be able to identify the role of speech processing strategies in use of cochlear implants• Be able to identify adult and pediatric qualifications for candidacy for use of cochlear implants
Content Topic List	<ul style="list-style-type: none">• Cochlear implant• Speech processing strategies• Health hazards of cochlear implants
Sought Concurrence	No

Attachments

- SHS 8931 Syllabus_2 ch (1).docx: current
(Syllabus. Owner: Brello, Jennifer)
- SHS 8931 Syllabus_3 ch.docx: new
(Syllabus. Owner: Brello, Jennifer)

Comments

COURSE CHANGE REQUEST
8931 - Status: PENDING

Last Updated: Vankeerbergen, Bernadette
Chantal
09/28/2023

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Brello, Jennifer	09/27/2023 09:15 PM	Submitted for Approval
Approved	Bielefeld, Eric Charles	09/27/2023 09:21 PM	Unit Approval
Approved	Vankeerbergen, Bernadette Chantal	09/28/2023 03:11 PM	College Approval
Pending Approval	Jenkins, Mary Ellen Bigler Hanlin, Deborah Kay Hilty, Michael Neff, Jennifer Vankeerbergen, Bernadette Chantal Steele, Rachel Lea	09/28/2023 03:11 PM	ASCCAO Approval

Cochlear Implants

SPHHRNG 8931, Spring 2025

Course Information

- **Course times and location:** TBD (2 80-minute classes/week) in Pressey Hall
- **Credit hours:** 3
- **Mode of delivery:** In-Person
- **Required Textbooks:**
 - Wolfe, J. (2020). *Cochlear Implants: Audiologic Management and Considerations for Implantable Hearing Devices*. San Diego, CA: Plural Publishing.
 - Sevier, J. D. (2023). *Complex Cochlear Implant Cases: Management and Troubleshooting*. San Diego, CA: Plural Publishing.
- **Required Readings:** Primary literature will be posted to CarmenCanvas
- **Textbook Support:** Many textbooks can be reserved through OSU libraries and the Ohio Link system. Additionally, the department has some textbooks available for borrowing. Please inform your instructor if you need help accessing these resources.

Instructor

- **Name:** Rachael Frush Holt, Ph.D., CCC-A
- **Pronouns:** She/Her/Hers
- **Email:** holt.339@osu.edu
- **Office location:** 136 Pressey Hall
- **Office hours:** By appointment
- **Preferred means of communication:**
 - My preferred method of communication for questions is **email**.
 - My class-wide communications will be sent through the Announcements tool in CarmenCanvas. Please check your [notification preferences](https://go.osu.edu/canvas-notifications) (go.osu.edu/canvas-notifications) to be sure you receive these messages.

Land Acknowledgement

The Department of Speech and Hearing Science acknowledges the land that The Ohio State University occupies is the ancestral and contemporary territory of the Shawnee, Potawatomi, Delaware, Miami, Peoria, Seneca, Wyandotte, Ojibwe and Cherokee peoples. Specifically, the



THE OHIO STATE UNIVERSITY

College of Arts and Sciences
Department of Speech and Hearing Science

university resides on land ceded in the 1795 Treaty of Greeneville and the forced removal of tribes through the Indian Removal Act of 1830. As a land grant institution, we want to honor the resiliency of these tribal nations and recognize the historical contexts that has and continues to affect the Indigenous peoples of this land.

Course Prerequisites

Graduate standing or permission of instructor.

Course Description

In this course students will have the opportunity to learn about electrical hearing, cochlear implant design and processing, current cochlear implant candidacy requirements, surgical considerations, electrophysiological measures with cochlear implants and their clinical applications, the latest research on neurocognitive and psychosocial development in children with cochlear implants, outcomes in adults, factors that contribute to outcomes in cochlear implant recipients, troubleshoot and manage complex cases, and carry out hands-on programming.

Learning Outcomes

Upon completion of this course, students will be able to achieve the following objectives:

- Identify differences between acoustic and electric hearing
- Differentiate among current cochlear implant processing strategies
- Describe the development of cochlear implant processing strategies
- Apply candidacy requirements to clinical practice
- Outline the application of electrophysiological measures of cochlear implants for clinical use
- Recall cutting-edge outcomes of the latest research on neurocognitive and psychosocial development, and factors that contribute to these areas of development in children who have received cochlear implants and describe how this relates to clinical work with children and their families
- Recall results of research on outcomes in adults and describe how this relates to clinical work with adults and their families
- Conduct introductory-level cochlear implant programming
- Apply what is learned in this course and integrate it with previous coursework to complex cochlear implant case studies



How This Online Course Works

Mode of delivery: This course is an in-person course. All class sessions are required and will be offered in person in Pressey XX on Y and Z each week from time A to time B. The rest of your work is found in Carmen and can be completed around your own schedule during the week.

Credit hours and work expectations: This is a 3-credit-hour course. According to [Ohio State bylaws on instruction](http://go.osu.edu/credithours) (go.osu.edu/credithours), students should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of C average.

Attendance and participation requirements: Research shows regular participation is one of the highest predictors of success. With that in mind, I have the following expectations for everyone's participation:

- **In-Person meetings: Required**
All live, scheduled events for the course are required.
- **Engaging in the assigned readings: At least twice per week**
You are expected to engage in active reading of the assigned articles posted to the Carmen site, as well as the textbook, twice every week.

Course Materials, Fees and Technologies

- **Computer:** current Mac (MacOS) or PC (Windows 10) with high-speed internet connection that can have cochlear implant software loaded onto it
- **Other:** a mobile device (smartphone or tablet) to use for BuckeyePass authentication

If you do not have access to the technology you need to succeed in this class, review options for technology and internet access at go.osu.edu/student-tech-access.

Required Software

Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365. Visit the [installing Office 365](https://go.osu.edu/office365help) (go.osu.edu/office365help) help article for full instructions.

CarmenCanvas Access

You will need to use [BuckeyePass](https://buckeyepass.osu.edu) (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the [BuckeyePass - Adding a Device](https://go.osu.edu/add-device) (go.osu.edu/add-device) help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- [Install the Duo Mobile application](https://go.osu.edu/install-duo) (go.osu.edu/install-duo) on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at [614-688-4357 \(HELP\)](tel:614-688-4357) and IT support staff will work out a solution with you.

Technology Skills Needed for This Course

- Basic computer and web-browsing skills
- [Navigating CarmenCanvas](https://go.osu.edu/canvasstudent) (go.osu.edu/canvasstudent)

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat:** go.osu.edu/it
- **Phone:** [614-688-4357 \(HELP\)](tel:614-688-4357)
- **Email:** servicedesk@osu.edu

Grading and Faculty Response

How Your Grade is Calculated

Assignment Category	Points
Midterm Examination	30%
Final Examination	30%
Complex Cases Project	40%

See [Course Schedule](#) for due dates.

Descriptions of Major Course Assignments

Examinations

Description There will be 1 midterm examination and 1 final examination, each worth 30% of the final grade. The midterm exam will be administered on **February 14** and the final exam on **April 30**. Questions will include short answer, multiple-choice, and short essay questions. They will cover lectures, guest lectures, assigned readings, videos, and class discourse. Notes, readings, class materials including PowerPoint slides, the internet, and knowledge from other people are **not** allowed to be used during tests.

Complex Cases Project

Description The entire last month of this course will be dedicated to integrating what is learned during the first 3 months of the course with other coursework and applying it to complex cochlear implant clinical cases. The cases have been compiled by Sevier in the assigned text, *Complex Cochlear Implant Cases: Management and Troubleshooting*. The cases were selected and written by clinical audiologists who specialize in cochlear implants and work at high-volume cochlear implant centers. Students will review the cases from the assigned text, noting which ones are of particular interest, and on **March 8** we will determine case assignments. The assignment has three parts:

- 1) **5- to 6-page literature review and reflection** that: details the specific etiology of deafness and/or combination of hearing-related, health-related, developmental, and environmental factors that together make the case selected complicated; uses an evidence-based approach to critique the decisions made in each case; and discusses the prognosis and/or future issues that could arise and why. This document should be prepared and written independently and is worth 20% of the

overall course grade. Below are the specific writing guidelines (do not deviate from them):

- 1-inch margins,
- Single-spaced
- 12-point Times New Roman font
- No cover page
- Pay close attention to grammar, spelling (and typos)
- Use APA citation style
- **Submit via CarmenCanvas the day of your discussion (see below)**

2) **Facilitate a meaningful and engaging 35-minute in-class discussion about the case.** Each student is expected to determine how to best lead a meaningful and engaging discussion about the case. Discussions could contain PowerPoint slides with relevant test results or background information. Two cases will be presented each day (**please see the day-by-day schedule below to know when your case is to be presented**). The discussion is worth 15% of the overall course grade.

3) **Contribute meaningfully and regularly to in-class discussions about each case.** Every student must read and be prepared to provide meaningful insights, questions, and comments about each case (**again, please see the day-by-day schedule to know which cases are being discussed each day**). Being prepared for case discussions and providing meaningful answers to group questions, asking insightful questions, and sharing your own thoughts about cases is worth 5% of the overall course grade.

Academic integrity and collaboration: Your written assignments should be your own original work, including the literature review and reflection, any PowerPoints used (appropriately credit figures or tables used), and exam answers. In formal assignments (literature review and reflection), you should follow APA style to cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in but no one else should revise or rewrite your work.

Late Assignments

Please refer to CarmenCanvas and this syllabus for due dates. Due dates are set to help you stay on pace and to allow timely feedback that will help you complete subsequent assignments. In general, late assignments will not be accepted, as the due dates for all assignments are known throughout the semester. If there are circumstances that are out of your control that require an extension, please contact the professor immediately to discuss the situation.

Instructor Feedback and Response Time

I am providing the following list to give you an idea of my intended availability throughout the course. Remember that you can call [614-688-4357 \(HELP\)](tel:614-688-4357) at any time if you have a technical

problem.

- **Preferred contact method:** If you have a question, please contact me first through my Ohio State email address (holt.339@osu.edu). I will reply to emails within 24 hours on weekdays when class is in session at the university. Messages sent over the weekend or a holiday will be answered the following work day.
- **Class announcements:** I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check [your notification preferences](http://go.osu.edu/canvas-notifications) (go.osu.edu/canvas-notifications) to ensure you receive these messages.
- **Grading and feedback:** I will provide feedback and grades within seven days of the due date.

Grading Scale

93–100: A
 90–92.9: A-
 87–89.9: B+
 83–86.9: B
 80–82.9: B-
 77–79.9: C+
 73–76.9: C
 70–72.9: C-
 67–69.9: D+
 60–66.9: D
 Below 60: E

Other Course Policies

Discussion and Communication Guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** Remember that on formal assignments you should use good grammar, spelling, and punctuation. A more conversational tone is fine for non-academic topics (e.g., emails).
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online. I will provide specific guidance for discussions on controversial or personal topics.
- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. For assignments, please follow APA citation style.



Academic Integrity Policy

See [Descriptions of Major Course Assignments](#) for specific guidelines about collaboration and academic integrity in the context of this class.

Ohio State's Academic Integrity Policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the university's [Code of Student Conduct](#) (studentconduct.osu.edu), and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the university's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the university's *Code of Student Conduct* is never considered an excuse for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- [Committee on Academic Misconduct](http://go.osu.edu/coam) (go.osu.edu/coam)
- [Ten Suggestions for Preserving Academic Integrity](http://go.osu.edu/ten-suggestions) (go.osu.edu/ten-suggestions)
- [Eight Cardinal Rules of Academic Integrity](http://go.osu.edu/cardinal-rules) (go.osu.edu/cardinal-rules)

Copyright for Instructional Materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes

associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Supporting Equity and Creating Inclusive Environments

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited. University policies and other resources may be found here:

<http://www.studentaffairs.osu.edu/bias/>

Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Office of Institutional Equity:

1. Online reporting form at equity.osu.edu,
2. Call 614-247-5838 or TTY 614-688-8605,
3. Or email equity@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Office of Institutional Equity to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

Your Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, [on-demand mental health resources](https://go.osu.edu/ccsondemand) (go.osu.edu/ccsondemand) are available. You can reach an on-call counselor when CCS is closed at [614- 292-5766](tel:614-292-5766). **24-hour emergency help** is available through the [National Suicide Prevention Lifeline website](https://www.suicidepreventionlifeline.org) (suicidepreventionlifeline.org) or by calling [1-800-273-8255\(TALK\)](tel:1-800-273-8255). [The Ohio State Wellness app](https://go.osu.edu/wellnessapp) (go.osu.edu/wellnessapp) is also a great resource.

Religious Accommodations

It is Ohio State's policy to reasonably accommodate the sincerely held religious beliefs and practices of all students. The policy permits a student to be absent for up to three days each academic semester for reasons of faith or religious or spiritual belief.

Students planning to use religious beliefs or practices accommodations for course requirements must inform the instructor in writing no later than 14 days after the course begins. The instructor is then responsible for scheduling an alternative time and date for the course requirement, which may be before or after the original time and date of the course requirement. These alternative accommodations will remain confidential. It is the student's responsibility to ensure that all course assignments are completed.

Accessibility Accommodations for Students with Disabilities

Requesting Accommodations

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with [Student Life Disability Services \(SLDS\)](#). After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services.

Disability Services Contact Information

- Phone: [614-292-3307](tel:614-292-3307)
- Website: slds.osu.edu
- Email: slds@osu.edu
- In person: [Baker Hall 098, 113 W. 12th Avenue](#)

Accessibility of Course Technology

This online course requires use of CarmenCanvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations as early as possible.

- [CarmenCanvas accessibility](http://go.osu.edu/canvas-accessibility) (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- [CarmenZoom accessibility](http://go.osu.edu/zoom-accessibility) (go.osu.edu/zoom-accessibility)

Course Schedule

Subject to change. Any changes will be announced in class.

Tentative Date	Required Readings	Topics(s) and Items Due
1/8	NAD Pos. Stmt. (2000) Wolfe Ch. 1 (1-6)	Introduction to the course and review of syllabus Cochlear implants and Deaf culture
1/10	Wolfe Ch. 8 (229-239) Zeng (2022)	Speech acoustics
1/15	No Class	No Class: Martin Luther King, Jr. Holiday
1/17	Wolfe Ch. 1 (pp. 6-24) Wolfe Ch. 2	(Brief) History of CIs Electrical hearing
1/22	Wolfe Ch. 7 (pp. 191-215) Croghan et al. (2017)	Cochlear implant design
1/24	Wolfe Ch. 8 (pp. 239-254)	Signal processing in cochlear implants
1/29	Moore (2003) Liu et al. (2017)	Signal processing in cochlear implants
1/31	Wolfe Ch. 3 (pp. 92-99), Wolfe Ch. 4	Cochlear implant regulatory approval
2/5	Wolfe Ch. 5 Varadarajan et al. (2021)	Candidacy for cochlear implants: Adults
2/7	Wolfe Chs. 6 & 13	Candidacy for cochlear implants: Children
2/12	Wolfe Chs. 12 & 24 Trecca et al. (2020)	<i>Guest lecture: Oliver Adunka, MD</i> CI surgery, intracochlear electrocochleography
2/14	No Readings	Midterm Exam
2/19	Wolfe Ch. 18 He et al. (2018)	<i>Guest lecture: Shuman He, MD, PhD</i> Biophysics and physiology: ERPs and CI programming
2/21	Wolfe Chs. 7 (pp. 216-225), 11 (browse), & 17 Davidson et al. 2021	<i>Charlie Moubrey, Au.D.</i> <i>Shana Lucius, M.A., CCC-SLP, LSLs Cert. AVT</i> MED-EL CI programming and aural (re-)habilitation
2/26	Wolfe Chs. 10 (browse), 14, & 16	<i>Guest lecture: Chelsea Bates, Au.D., CCC-A</i> Cochlear Corporation CI programming
2/28	Wolfe Chs. 19 & 21	Adult outcomes I
3/4	Moberly et al. 2020	Adult outcomes II
3/8	Wolfe Ch. 23 Sevier Appendix A & B Look over Sevier cases	In-Class preparation for Complex Cochlear Implant Cases Project
3/11-13	No Readings	No Class – Spring Break
3/18	Wolfe Ch. 22 JAAA Clinical Practice Guidelines	Child outcomes I

Tentative Date	Required Readings	Topics(s) and Items Due
3/20	Jung & Houston (2020) Wang et al. (2020) Thomas & Zwolan (2019)	Child outcomes II
3/25	Castellanos et al. (2017) Kral et al. (2016) Houston et al. (2022)	Child outcomes III
3/27	Wolfe Ch. 22 Holt Family Dynamics Chapter	Sources of individual differences in pediatric outcomes
4/1	Sevier Chs. 1 & 2	Complex Cases Projects: - Middle Ear Status (Ch. 1) - Fluctuating Impedance (Ch. 2)
4/3	Sevier Chs. 5 & 6	Complex Cases Projects: - Facial N. Stimulation (Ch. 5) - Management of Facial N. Stimulation and Pain (Ch. 6)
4/8	Sevier Chs. 3 & 4	Complex Cases Projects: - Pitch-confused electrodes (Ch. 3) - Odd perceptions (Ch. 4)
4/10	Sevier Chs. 7 & 8	Complex Cases Projects: - NF2 (Ch. 7) - Surgical revision (Ch. 8)
4/15	Sevier Chs. 9 & 10	Complex Cases Projects: - Changes in perception I (Ch. 9) - Changes in perception II (Ch. 10)
4/17	Sevier Chs. 11 & 12	Complex Cases Projects: - Pediatric programming (Ch. 11) - Overstimulation (Ch. 12)
4/22	Sevier Chs. 13 & 14	Complex Cases Projects: - SSD (Ch. 13) - EAS (Ch. 14)
4/30	<i>No Readings</i>	Final Exam



SPHHRNG 8931
Cochlear Implants
Spring 2024
2 credits

Instructor:	Rachael Frush Holt, Ph.D., CCC (Audiology)	Office:	136 Pressey
E-mail:	holt.339@osu.edu	Telephone:	614.292.9126
Class Schedule:	F 10:00am – 12:00pm in 0035 Pressey Hall	Office Hours:	By appointment

Course Description:

In this course students will have the opportunity to learn about electrical hearing, cochlear implant design and processing, current cochlear implant candidacy requirements, surgical considerations, electrophysiological measures with cochlear implants and their clinical applications, the latest research on family environment effects, and language and psychosocial development in children with cochlear implants, outcomes in adults, and carry out hands-on programming.

Course Objectives:

Upon completion of this course, students will be able to achieve the following objectives:

- Identify differences between acoustic and electric hearing
- Differentiate among current cochlear implant processing strategies
- Describe the development of cochlear implant processing strategies
- Apply candidacy requirements to clinical practice
- Outline the application of electrophysiological measures of cochlear implants for clinical use
- Recall cutting-edge outcomes of the latest research on language development, psychosocial skills, and family environment in children who have received cochlear implants and describe how this relates to clinical work with children and their families
- Recall results of research on outcomes in adults and describe how this relates to clinical work with adults and their families
- Conduct intro-level programming of cochlear implants

Optional Readings: This course draws students from many different backgrounds and departments. Students with limited background in auditory physiology, auditory perception and hearing loss and those who would like a refresher on these topics are advised to meet with Prof. Holt during the first week of the course to be directed to outside readings that will provide helpful background for understanding the course material.

Required Texts: Eisenberg, L.S. (Ed.). (2017). *Clinical Management of Children with Cochlear Implants* (2nd Ed.). San Diego, CA: Plural Publishing.

Chorost, M. (2006). *Rebuilt: My Journey Back to the Hearing World*. New York, NY: Houghton Mifflin Harcourt.

Required Readings: Selected journal articles, monographs and book chapters (not from the required texts) will be available on Canvas in pdf format.

Castellanos, I., Kronenberger, W. G., & Pisoni, D. B. (2017). Psychosocial outcomes in long-term cochlear implant users. *Ear & Hearing*, 39, 527-539.

- Crowe, K., Fordham, L., McLeod, S., & Ching, T. Y. (2014). 'Part of our world': Influences on caregiver decisions about communication choices for children with hearing hearing loss. *Deafness & Education International*, *16*, 61-85.
- Donaldson, G. S., Dawson, P. K., & Borden, L. Z. (2011). Within-subjects comparison of the HiRes and Fidelity120 speech processing strategies: Speech perception and its relation to place-pitch sensitivity. *Ear and Hearing*, *32*, 238-250.
- Dorman, M., Loizou, P., Spahr, A., & Maloff, E. (2002). Factors that allow a high level of speech understanding by patients fit with cochlear implants. *American Journal of Audiology*, *11*, 119-123.
- Eisenberg, L. S., Fisher, L. M., Johnson, K. C., Ganguly, D. H., Grace, T., Niparko, J. K., & the CDaCI Investigative Team. (2016). Sentence recognition in quiet and noise by pediatric cochlear implant users: Relationship to spoken language. *Otology & Neurotology*, *37*, e75-e81.
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Course Notes: The PowerPoint slides, handouts, and syllabus will be available on Canvas. It is not required that students use the slides; they are made available should students find course slides helpful in learning and integrating the material.

Course Requirements: Midterm Examinations (25% each)
Term Paper (50%)

Examinations (50%)

There will be two midterm examinations given in class, each worth 20% of the final grade. The midterm exams will be administered on **February 8** and **April 12**. Questions will include short answer, multiple-choice, and short essay questions. They will cover lectures, guest lectures, assigned readings, in-class videos and class discourse.

Term Paper (50%)

Students will select a clinically relevant question to research and answer from the list below (or propose a topic and get it approved by the professor by **February 15** if something they would like to write about is not listed below). These are very discrete questions that may be addressed in part by some of our class readings or by chapters in the textbook. However, students will have to look for other research articles that can help answer the question. The answer, which will be supported in a 10- to 11-page research paper, should be guided by *evidence*. The research paper is due **Friday, April 19** and should be turned in **electronically** in Microsoft Word format. The abstract (discussed below) and citations from each paper will be compiled into a single document and shared with every student in the class via Canvas. This exposes all students to each topic, as well as allows them to easily follow-up and read more about each topic that they find particularly interesting. Please report your selected topics to the professor on or before **February 15**. Below are the specific writing guidelines (do not deviate from them):

- 10 to 11 double-spaced pages (does *not* include references)
- 1-inch margins
- 12-point Times New Roman font
- No cover page
- Use at least 10 peer-reviewed papers as references (FYI: *Ear and Hearing*, a peer-reviewed journal, publishes a lot of papers on implantable auditory prostheses)
- Use between 2-4 sources (a combination of *talks* and *posters*) from the 2019 Annual Meeting of the American Academy of Audiology, Columbus, OH
- The paper should begin with an **abstract** not to exceed 200 words
 - The abstract should *briefly* state the clinically relevant question, background information about the importance of the question, the answer to the question (the student should firmly answer the question – yes or no), and the literature supporting this answer
 - *Pro-tip*: even though the abstract appears first, it should be written last because it summarizes the paper
- After the abstract the student should state the question and provide background outlining why this is an important question in approximately 1-2 pages
- Then, the student should *clearly* state her/his answer to the question based on her/his review of the literature (e.g., “**Yes**,.....” or “**No**,.....”)
- The remaining pages should outline the evidence supporting the student’s answer, **integrating** the results of the separate papers
 - Note that this section is not a laundry list of studies; rather, the student should integrate the studies in a coherent, logical fashion
 - Students should take care to note any limitation(s) of the studies they cite
- The student should point out what future areas of research are needed in this area
- The final page should describe the clinical implications of the student’s answer to the question

- Pay close attention to grammar, spelling (and typos), and organization (particularly whether it is organized in a logical fashion), because these will be evaluated (in addition to the content)
 - Subheadings often help with organization
- The paper should end with a **reference** section
- Use APA citation style throughout

Clinical Questions:

1. Should children receive bilateral cochlear implants? If so, are some candidates better than others?
2. Should unilateral deaf patients receive cochlear implants?
3. Should deaf patients forgo cochlear implantation in hopes of capitalizing on the research on hair cell regeneration?
4. Should multiply impaired children receive cochlear implants? If so, are certain sub-populations better candidates than others?
5. Is there a communication modality/intervention for children with cochlear implants that is most effective for developing spoken language? If so, what is it? What factors contribute to language development?
6. Are tinnitus implants effective? If so, for who?
7. Do deaf children display deficits outside of the traditional domains of speech, language and hearing?
8. Should individuals with steeply sloping audiograms use hybrid acoustic-electric stimulation (monaural hearing aid and cochlear implant)?
9. Are auditory brainstem implants effective? If so, for who?
10. Should infants younger than 12 months of age receive a cochlear implant?
11. Do cochlear implants convey the essential features of music? Do cochlear implant recipients derive enjoyment from music?
12. Are osseointegrated hearing devices effective? If so, for who?
13. Should cochlear implant recipients raised in a bilingual environment be encouraged to use both languages or just one language?
14. Are cochlear implants beneficial for individuals who speak tonal languages (e.g., many languages of southeast Asia and Africa)?
15. What are the current technologies available for limiting channel interaction and are they effective?
16. Are vestibular prostheses effective? If so, for who?
17. What cochlear implant technology is available to help improve speech recognition in background noise and is it effective?

Grading Scale:	A	93-100%	C+	77-79.9%
	A-	90-92.9%	C	73-76.9%
	B+	87-89.9%	C-	70-72.9%
	B	83-86.9%	D+	67-69.9%
	B-	80-82.9%	D	60-66.9%
			E	59.9% and below

Standards for grades:

- A Achievement that is outstanding relative to the level necessary to meet course requirements.
- B Achievement that is significantly above the level necessary to meet course requirements.
- C Achievement that meets the course requirements in every respect.
- D Achievement that is worthy of credit even though it fails to meet fully the course requirements.
- Pass Achievement that is satisfactory, which is equivalent to a C- or better.
- E Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I (see also I). *Academic dishonesty in any portion of the academic work for a course shall be grounds for awarding a grade of E for the entire course.*

- I (Incomplete) Assigned at the discretion of the instructor when, due to extraordinary circumstances (e.g., hospitalization), a student is prevented from completing the work of the course on time. Requires a written agreement between instructor and student.

Please do NOT ask me to raise your grade, even if you just barely missed the next highest grade. It is against OSU policy to change a grade for any reason other than a clerical error.

Academic Integrity:

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's *Code of Student Conduct*, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include, but are not limited to:

- Violation of course rules;
- Violation of program regulations;
- Knowingly providing or receiving information during a course exam or program assignment;
- Possession and/or use of unauthorized materials during a course exam or program assignment;
- Knowingly providing or using assistance in the laboratory, on field work, or on a course assignment, unless such assistance has been authorized specifically by the course instructor or, where appropriate, a project/research supervisor;
- Submission of work not performed in a course: This includes (but is not limited to) instances where a student fabricates and/or falsifies data or information for a laboratory experiment (i.e., a "dry lab") or other academic assignment. It also includes instances where a student submits data or information (such as a lab report or term paper) from one course to satisfy the requirements of another course, unless submission of such work is permitted by the instructor of the course or supervisor of the research for which the work is being submitted;
- Submitting plagiarized work for a course/program assignment;
- Falsification, fabrication, or dishonesty in conducting or reporting laboratory (research) results;
- Serving as or asking another student to serve as a substitute (a "ringer") while taking an exam;
- Alteration of grades in an effort to change earned credit or a grade;
- Alteration and/or unauthorized use of university forms or records.

Ignorance of the University's *Code of Student Conduct* is never considered an "excuse" for academic misconduct, so I recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am **obligated** by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's *Code of Student Conduct* (i.e., committed academic misconduct), **the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.**

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

The Committee on Academic Misconduct web pages (oaa.osu.edu/coam/home.html)
Ten Suggestions for Preserving Academic Integrity (oaa.osu.edu/coam/ten-suggestions.html)
Eight Cardinal Rules of Academic Integrity (www.northwestern.edu/uacc/8cards.html)

Academic Incivility:

Students have the right to expect the instructor to treat them respectfully. The instructor and fellow classmates have the right to expect that students act respectfully. This includes entering the class quietly if you must be late, refraining from conversing with a classmate during lecture, respecting other students' views and opinions, *silencing and putting away* cell phones, and *only using laptop computers/tablets for taking notes*. Using technology for activities other than note taking is distracting to those around you and thus, is not fair to your peers. Please see the instructor if you have a reason for needing to be accessed during class.

Equity & Inclusion:

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited. University policies and other resources may be found here:

<http://www.studentaffairs.osu.edu/bias/>

Sexual Misconduct/Relationship Violence:

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at titleix@osu.edu.

Counseling & Consultation Services:

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling [614-292-5766](tel:614-292-5766). CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at [614-292-5766](tel:614-292-5766) and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org. *These services are free and confidential.*

Accommodations:

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately

discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Course Outline
(Subject to change)

Tentative		
Date	Topic(s)	Readings
1/11	A. Introduction to the course and review of syllabus B. Treatment efficacy C. Cochlear implants and Deaf culture D. Speech Acoustics	Textbook Chapter 1 Dorman et al. (2002) NAD Position Statement (2000)
1/18	A. Basics of electrical hearing B. Device History C. Cochlear implant design	Wolfe Chapter 1
1/25–2/1	Signal Processing in Cochlear Prosthesis	Wolfe Chapter 8 Moore (2003) Donaldson et al. (2011) Eisenberg et al. (2016)
2/8	MIDTERM EXAM #1: Introduction through Signal Processing in Cochlear Prosthesis (75 min.) Candidacy for cochlear prosthesis A. Adults B. Children	 Wolfe Chapters 5 & 6 Current device websites
2/15	Surgical Considerations <i>Guest lecture: Aaron Moberly, M.D. (10-11am)</i> Candidacy for cochlear prosthesis (cont.) C. Assessment issues	Textbook Chapter 4 Textbook Chapter 3 Zwolen & Sorkin (2016)
	Term Paper Topic Selections are Due	
2/22	Current and Recent Prosthesis A. Nucleus devices (Cochlear Corporation) B. Clarion devices (Advanced Bionics corporation) C. Med-El devices Psychosocial development in children with cochlear implants <i>Guest lecture: Irina Castellanos, Ph.D. (11am-12pm)</i>	Browse Wolfe Chapters 9-11 Current device websites Textbook Chapters 12 & 13 Castellanos et al. (2017)
3/1	Moving beyond the debate: Language and communication modality in children with CIs Working collaboratively with families and professionals outside of speech and hearing <i>Guest lectures: Carrie Davenport, Ph.D.</i> (Dr. Holt to Annual Meeting of the American Auditory Society)	Textbook Chapters 16 & 18 Fitzpatrick et al. (2016) Yanbay et al. (2014) Textbook Chapter 19 Crowe et al. (2014)

The ASHA Certification Standards achieved in this course are listed below. Standards are met in part or in full through fulfillment of these knowledge and/or skills outcomes as evidenced by completion of the requirements outlined on the syllabus and earning a course grade of C or better.

Standard	KASA Requirements/Objectives	Learning Activities	Evaluation Criteria
A7.	Effects of hearing loss on communication and educational, vocational, social, and psychological functioning.	Exams Papers Readings Lecture	Instructor Grading
A9.	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 services.	Exams Lectures Readings Papers	Instructor Grading
A13.	Instrumentation and bioelectrical hazards.	Exams Lectures Observation	Instructor Grading
A14.	Physical characteristics and measurement of electric and other nonacoustic stimuli.	Exams Lectures Observation	Instructor Grading
A16.	Effects of cultural diversity and family systems on professional practice.	Exams Lectures Discussion	Instructor Grading
A18.	Principles and practices of research, including experimental design, statistical ethics, and application to clinical applications.	Exams Lectures Paper Readings	Instructor Grading
A22.	Oral and written forms of communication.	Exams Papers	Instructor Grading
A24.	The use of instrumentation according to manufacturer's specifications and recommendations.	Lectures Laboratory Observation	Instructor Grading
A29.	Consultation with professionals in related and/or allied service areas.	Exams Lectures	Instructor Grading
C5.	Conducting and interpreting behavioral and/or electrophysiologic methods to assess hearing thresholds and auditory neural function.	Exams Lectures Laboratory	Instructor Grading
C9.	Evaluating functional use of hearing.	Exams Lectures Observation	Instructor Grading
C10.	Preparing a report, including interpreting data, summarizing findings, generating recommendations, and developing an audiologic treatment/management plan.	Exams Lectures	Instructor Grading
D1.	The provision of intervention services (treatment) to individuals with hearing loss, balance disorders, and other auditory dysfunction that	Exams Lectures	Instructor Grading

	compromises receptive and expressive communication.	Laboratory	
D2.	Development of a culturally appropriate audiologic rehabilitative and management plan that includes, when appropriate, the following: a. Evaluation, selection, verification, validation, and dispensing of hearing aids, sensory aids, hearing assistive devices, alerting systems, captioning devices, and educating consumer and family/caregivers in the use of and adjustment to such technology. b. Determining of candidacy of persons with hearing loss for cochlear implants and other implantable sensory devices and provision of fitting, mapping, and audiologic rehabilitation to optimize device use. c. Counseling relating to psychosocial aspects of hearing loss and other auditory dysfunction, and process to enhance communication competence. d. Provision of comprehensive audiologic treatment for persons with hearing loss or other auditory dysfunction including but not exclusive to communication strategies, auditory training, speech reading, and visual communication systems.	Exams Lectures Readings Paper	Instructor Grading
D7.	Evaluation of the efficacy of intervention (treatment) services.	Exams Lectures Readings	Instructor Grading
F1.	Measuring functional outcomes, consumer satisfaction, efficacy, effectiveness, and efficiency of practices and programs to maintain and improve the quality of audiologic services.	Exams Lectures Readings	Instructor Grading
F2.	Applying research findings in the provision of patient care (evidence based practice).	Exams Lectures Paper	Instructor Grading