Syllabus for CSD 9527B: Modern Practices in Implantable Devices, Fall 2020

INSTRUCTOR:

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Office hours: Fridays from 1 pm to 3 pm, via Zoom.

CLASS TIME:

This course will be asynchronous. Pre-recorded lectures and readings will be posted in OWL on Monday mornings. The instructor will be available via Zoom, during office hours, to respond to your questions.

GOALS:

After completing this course, students should be able to:

- Explain to a patient or colleague, in appropriate detail, how cochlear implants (CIs) and other implantable devices work (components, functioning, and surgery) and their benefits, limitations, and risks
- Explain the perception of an average CI subject in various psychoacoustic tasks
- Apply implantable-device candidacy criteria for adults and children to sample patients
- Explain the principles of CI programming for adults and children
- Explain to a potential patient the process and likely outcomes of evaluation, implantation, and rehabilitation
- Critically evaluate manufacturer literature and draw on research literature for evidence-based practice
- Understand the challenges of CI outcomes in complex patient populations
- Understand how CI stimulation affects auditory development and plasticity

COURSE STRUCTURE:

This course is intended to provide a detailed description of the function of the auditory system with special reference to aspects important to cochlear implantation. The course covers basic mechanics and physiology of auditory detection and transduction at the level of the cochlea, as well as important aspects in central auditory processing, giving emphasis to issues that are particularly relevant to electrical stimulation with cochlear implant systems. Additional topics will cover candidacy evaluations and criteria, surgery, device considerations, CI fitting, speech processing strategy, pediatric and adult outcomes, and current research topics. Pre-recorded

lectures will be supplemented by hands-on laboratory sessions and other active learning opportunities.

PREREQUISITES:

This course is open to second-year M.Cl.Sc. Audiology students and, by permission of the instructors, to graduate students from other programs. Familiarity with the basics of audiometry and audiological practice and the hearing science material covered in CSD 4417 or CSD 9512 is assumed.

ZOOM USE FOR MEETINGS

Completion of this course will require you to have a reliable internet connection and a device that meets the system requirements for Zoom. Information about the system requirements are available at the following link: https://support.zoom.us/hc/en-us.

Please note that Zoom servers are located outside Canada. If you would prefer to use only your first name or a nickname to login to Zoom, please discuss this with your instructor in advance.

TEXTBOOK & OTHER MATERIALS

Recommended text: "Cochlear Implants ", Jace Wolfe, Plural Publishing, 2018. This is available from the publisher's website.

Additional selected readings will be provided from other textbooks and from the research literature.

Students are also encouraged to read one of the available personal memoirs by CI recipients: "Wired for Sound" by Beverly Biderman or "Rebuilt" by Michael Chorost, from which selected chapters will be assigned and provided as readings.

EVALUATION:

30% midterm exam

30% written laboratory reports and activities (10% for each lab)*

30% final exam

10% participation

*: Lab reports must be handed in as individual work.

MIDTERM EXAM

There will be one midterm real-time OWL exam focusing on the concepts presented in the first half of the course. A grade of at least 60% on the midterm exam is necessary to pass this course.

FINAL EXAM

There will be a final real-time OWL exam focusing on the concepts presented during the second half of the course. The final exam will be written during the regular final exam period. A grade of at least 60% on the final exam is necessary to pass this course.

The midterm and final exams in this course are designed to be completed within 3 hours in a standard in-person exam format. Following the principles of Universal Instructional Design, all students will be provided 6 hours to complete this exam in a timed online format, which will meet the needs of any students requiring extra time as part of their academic accommodations.

LABORATORY ACTIVITIES & REPORTS

This course includes **three lab** activity sessions. A written report on each lab session will typically be due two weeks following the activity. Lab report formats will be indicated at the time of the lab. Please contact the instructor privately if you require accommodations for any of the lab activities. A grade of at least 60% on EACH LAB is necessary to pass this course.

Lab 1 - In this lab you will perform some listening tasks that will illustrate the effect of noise and/or a limited number of CI frequency channels on speech intelligibility. Many CI users can achieve very good sentence and nonsense word recognition scores in quiet, but like other hearing impaired listeners, are severely impacted by background noise. You will try to identify sentences from the Hearing In Noise Test (HINT) and nonsense words from the Distinctive Features Differences (DFD) test. Each student will present his/her work individually.

Lab 2 – Deep dive into the different manufacturers' CI similarities and differences. During this activity you will be divided into 4 groups and each group will explore a CI manufacturer`s website. Each group will create a 30 minutes 'sales pitch' presentation, in VoiceThread. Each student will present his/her work individually.

Lab 3 – For this lab you will find a CI-related topic you would like to read more and present to your class. Please find a minimum 3 significant research papers on the chosen topic per student. For more complex topics, you can work in teams of maximum 4 students. Please make a VoiceThread presentation on your topic, describing the papers you read and your conclusion on that topic. Each student has a maximum of 10 minutes to present the 3 papers and conclusions. Each student will present his/her work individually.

PARTICIPATION

Students are expected to contribute to discussions and dialog. Discussion topics will include issues raised by lecture material, assigned readings, and others that arise.

ATTENDANCE

Please refer to the Student Handbook for our Program's absence policy. If you are unable to participate in any scheduled activity for any reason (including a positive COVID screening result), please contact all relevant instructors as soon as possible. If you require academic relief (e.g. make-up exam, change of due date) due to an absence, you must request it through the Student Support Committee, and documentation may be required. If you must miss in-person instruction sessions due to a positive COVID screening result or to illness, we will assist you in completing those activities as soon as is feasible once you are able to return.

READINGS

The material covered in this course is extensive, and some of the concepts may not be familiar to you. The topic requires a mix of audiology, physiology, and engineering. Lectures and the texts are complementary, but not the same. You should both watch lectures and refer to written material, posted on OWL, to help consolidate what you have learned from lectures. For examinations, the emphasis will be from the lectures, but reading a text can really help you to understand the material. Since this course lays the groundwork for very important clinical measurement techniques, it is important that you make the effort to learn the fundamentals!

RECORDINGS OF REMOTE LEARNING SESSIONS

All of the remote learning sessions for this course will be recorded. The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals under special circumstances. Please contact the instructor if you have any concerns related to session recordings.

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

OTHER NOTES:
Online Etiquette

Some components of this course will involve online interactions. To ensure the best experience for both you and your classmates, please refer to the relevant sections of the CSD Student Handbook on professionalism and classroom conduct, and honour the following rules of etiquette:

- please "arrive" to class on time
- as a security measure, only participants using their UWO credentials will be permitted to access the class
- please use your computer and/or laptop if possible (as opposed to a cell phone or tablet)
- ensure that you are in a private location to protect the confidentiality of discussions in the event that a class discussion deals with sensitive or personal material

- to minimize background noise, kindly mute your microphone for the entire class until you are invited to speak, unless directed otherwise
- In order to give us optimum bandwidth and web quality, please turn off your video camera for the entire class unless you are invited to speak
- please be prepared to turn your video camera off at the instructor's request if the internet connection becomes unstable
- unless invited by your instructor, do **not** share your screen in the meeting

The course instructor will act as moderator for the class and will deal with any questions from participants. To participate please consider the following:

- if you wish to speak, use the "raise hand" function and wait for the instructor to acknowledge you before beginning your comment or question
- remember to unmute your microphone and turn on your video camera before speaking
- self-identify when speaking
- remember to mute your mic and turn off your video camera after speaking (unless directed otherwise)

General considerations of "netiquette":

- Keep in mind the different cultural and linguistic backgrounds of the students in the course.
- Be courteous toward the instructor, your colleagues, and authors whose work you are discussing.
- Be respectful of the diversity of viewpoints that you will encounter in the class and in your readings. The exchange of diverse ideas and opinions is part of the scholarly environment. "Flaming" is never appropriate.
- Be professional and scholarly in all online postings. Cite the ideas of others appropriately.

Note that disruptive behaviour of any type during online classes, including inappropriate use of the chat function, is unacceptable. Students found guilty of Zoom-bombing a class or of other serious online offenses may be subject to disciplinary measures under the Code of Student Conduct

Accessibility: Western is committed to achieving barrier-free accessibility for all its members, including graduate students. As part of this commitment, Western provides a variety of services devoted to promoting, advocating, and accommodating persons with disabilities in their respective graduate program.

Graduate students with disabilities (for example, chronic illnesses, mental health conditions, mobility impairments) are encouraged to register with Student Accessibility Services, a confidential service designed to support graduate and undergraduate students through their academic program. With the appropriate documentation, the student will work with both SAS and their graduate programs (normally their Graduate Chair and/or Course instructor) to ensure that appropriate academic accommodations to program requirements are arranged. These

accommodations include individual counseling, alternative formatted literature, accessible campus transportation, learning strategy instruction, writing exams, and assistive technology instruction.

For more information, see http://www.sdc.uwo.ca/ssd/

<u>OWL:</u> The class web page will be used to make lecture materials available.

<u>Online assistance:</u> If you need to ask a straightforward question by email, I will respond during regular business hours. Please use your Western email and informative subjective lines that begin with 9527. If your question is course-related, post it to our discussion forums. See student conduct below for further information about emails.

<u>Health and Wellness:</u> Students who are in emotional/mental distress should refer to Mental Health@Western http://www.uwo.ca/uwocom/mentalhealth for a complete list of options about how to obtain help.

STUDENT CONDUCT:

Plagiarism: Students must do their own work. It is encouraged to learn together, but each individual must understand the material, work through problems themselves, and submit only their own individual work. If written answers use ideas or short passages from other authors, they must be properly referenced. Plagiarism is a major offense (see Scholastic Offence Policy in the Western Academic Calendar). Papers and reports may be required to be submitted online via the OWL interface.

Passing Requirements: This course contains both group work and specific pass requirements (required elements), as specified above. To pass this course you must attain a grade of at least 60% according to the usual grade weighting given above AND you must attain a grade of at least 60% across the individual (non-group) work elements AND attain at least the passing grade for each required element. If your grade on individual work is lower than 60% OR if you have not passed each of the required elements, your submitted grade will be the lower of: a) 59% and b) your grade calculated as usual according to the weighting given above. That is, the highest grade possible if individual work and/or required elements are not passed would be 59%.

Lab reports and project milestones: Late submissions will be accepted, but there will be a penalty without a valid excuse (e.g. doctor's note). For lab reports, the penalty is 10% of the assignment's value per day, and for project milestones, the daily penalty is 1 percentage point of the total (25%) regardless of the grade value of the milestone.

Weeks	Topics	Reading (to be completed prior to the given date)	Labs, Due Dates & Other Information
Sep 14	Physiology, anatomy, effects of deafness, hearing science review		
Sep 21	Basics of electrical stimulation of the auditory nerve Single-channel psychophysics	Collette McKay, "Psychophysics and electrical stimulation". Sections 1-3. from Zeng et al, *Cochlear Implants*. Chapter 7.	
Sep 28	Programming parameters, speech and speech processing strategies	Readings on programming strategies provided on OWL Rebuilt: Ch 5 & 7	*Lab 1 instructions*
Oct 5	Sound perception and performance: speech, music, environmental sounds, the concept of functional channels Bimodal / electro-acoustic CI use. Auditory brainstem & other implants	Friesen et all J. Acoust. Soc. Am. 110 (2), Aug. 2001: "Speech recognition in noise as a function of the number of spectral channels". Shafiro et al (2011):Perception of environmental sounds.	**Lab 1 intro**
Oct 12	Spatial hearing review. Bilateral CI and binaural technology		
Oct 19	Midterm		**Lab 1 due**
Oct 26	Basic functioning of CIs. Devices components and manufacturer products.		**Lab 2 intro**
Nov 2	Overview of Bone Anchored Hearing Devices		
Nov 9	**Lab 2** presentations review		**Lab 2 due**
Nov 16	Challenges with CIs in different patient populations		**Lab 3 intro**
Nov 23	Programming and troubleshooting CIs from the OR to the clinic, using subjective and objective measures		
Nov 30	Patient Panel & TBD		
Dec 7	**Lab 3** presentations review		**Lab 3 due**
Final Exam – During Designated Exam Period			