Description of Course
This course uses didactic lecture, seminar discussion and problem-based learning to provide the student with depth and breadth of knowledge regarding the science of “electrical hearing” with an implanted neural stimulator. The course will emphasize the scientific bases of our clinical practices and research findings in the areas of neurobiology of hearing and deafness, the biophysics and physiology of “electrical hearing”, speech processing, the psychophysics of electrical stimulation, speech perception with cochlear implants, binaural hearing, bi-modal (acoustic and electrical) hearing and perception of music with cochlear and brainstem implants. Candidacy for implantation, prognosis with electrical hearing, and clinical outcomes from implantation will be discussed. Current technologies for bone-anchored and completely implantable hearing aids will also be considered, including candidacy and clinical outcomes. In addition, the state-of-the-science in vestibular implants will be reviewed.

Instructor and Contact Information
Instructor: Dr. Barbara Cone
Office Hours: W 2:00-4:00 or by appointment
Office Location: SLHS Room 518
Office Phone: 626-3710
Email: conewess@email.arizona.edu
Course Website on D2L

Course Format and Teaching Methods
This course uses didactic lecture, seminar discussion and problem-based learning methods. The instructional format for this course will include the following: lecture, review of research articles and seminar discussion and group problem-solving activities. This course is designed to promote student engagement with and reflection about the content; you are expected to take an active role in learning.

Course Objectives and Expected Learning Outcomes
The outcomes from this course are that the learners will be able to:

A. Discuss the neurobiology of hearing and deafness.
B. Describe the response of the central nervous system to electrical stimulation of the auditory nerve and cochlear nucleus.
C. Outline issues in the biophysics and physiology of electrical hearing.
D. Describe different methods of speech processing: a) for an engineer or scientist; b) for the parents of a deaf infant.
E. Synthesize the research findings in the area of psychophysics of electrical stimulation.
F. Discuss speech perception with implants and cite research which establishes the range of
speech perception abilities in those with implants.
G. List and critique the methods used pre- and post-surgical assessment of candidates for cochlear implants. Develop a clinical protocol for pre- and post-surgical assessment of candidates for cochlear implants.
H. Cite and describe the data-based studies providing cochlear implant outcome data in post-lingually deafened adults, and pre-lingually deafened infants and children.
I. Translate the findings from #H (above) into an informational counseling session that you would use in your clinical practice.
J. Critically analyze the current research on binaural and bimodal cochlear implants and develop candidacy guidelines for your clinical practice; translate your analyses into an informational counseling session that you would use in your clinical practice.
K. Discuss the current findings for music perception with implants and describe how the processing of music differs from that for speech; list the benefits and limitations of current implant technologies for music perception.
L. Describe bone-anchored hearing aid technology and provide objective criteria for determining candidacy. Discuss the audiological outcomes for bone-anchored hearing aids.
M. Discuss the “state of the art/science” of completely-implantable hearing aids and summarize the challenges that are yet to be overcome for such technology.
N. Discuss the “state of the science” of electrical stimulation of the vestibular system for those with vestibular deficits.

Absence and Class Participation Policy
The UA’s policy concerning Class Attendance, Participation, and Administrative Drops is available at http://catalog.arizona.edu/2015-16/policies/classatten.htm

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable: http://policy.arizona.edu/human-resources/religious-accommodation-policy.

Absences preapproved by the UA Dean of Students (or dean’s designee) will be honored. See http://uhap.web.arizona.edu/policy/appointed-personnel/7.04.02

Participating in the course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures. Please notify the instructor by e-mail if you need to miss a class due to illness or emergency.

Course Communications
Communication will be conducted using UA e-mail address and D2L.

Required Texts or Readings

Required


An extensive reading list is provided, and all articles are available on the D2L course web-site. We will be using the reading list in conjunction with the textbooks.

Assignments/Projects: Schedule/Due Dates

There will be 8 Assignments worth 10 points each. At least one of these assignments will be an on-line discussion, and another will be a team presentation in class.
The Clinical Guidelines project will be worth 20 points. It will involve a presentation on Dec 4th and a final write-up that is due on 12 December.

For assignments requiring team-work, every effort has been made to schedule enough class time to work on these so that you need not schedule extra meetings.

Total number of assignments and their point value:

8-X-10 Assignments=80 points
1-X -10 Presentation of clinical guideline = 10 points
1 X-10 Write-up of clinical guideline = 10 points

Total points = 100.

Schedule of Assignments:

<table>
<thead>
<tr>
<th>Date Given</th>
<th>Date Due (9:00 A.M.)</th>
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<tbody>
<tr>
<td>8/28/18</td>
<td>9/4/18</td>
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<tr>
<td>9/11/18</td>
<td>9/20/18</td>
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<tr>
<td>9/18/18 (Problem-based learning) (work in teams on 9/25/18)</td>
<td>10/2/18 (in-class presentation)</td>
</tr>
<tr>
<td>9/25/18</td>
<td>10/4/18</td>
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<tr>
<td>10/9/18</td>
<td>10/18/18</td>
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<tr>
<td>10/30/18</td>
<td>11/8/18</td>
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<tr>
<td>11/13/18 (note—no class today)</td>
<td>11/20/18</td>
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<tr>
<td>11/27/18</td>
<td>12/4/18</td>
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</tbody>
</table>

Work on the Clinical Guidelines Project commences on 10-16-18 and culminates in a presentation on 12/4/18 and a written product on 12/12/18.

Grading Scale and Policies

**Evaluation Scale:** A = 100 – 90%, B = 89-80%, C = 79-70%, D=60-69%, E = <60%.

Assignments are graded on content (70%) and form (30%).

**Content (total of 7 points or 70%)**
Covers all important points = 5
Covers most important points = 4
Covers some important points = 3
Misses the point = 0

Citations used are appropriate in type and number = 2
For each false or incorrect statement of fact made, a point (10%) will be deducted.

**Form (Total of 3 points or 30%)** Please refer to the writing rubric posted on D2L.
University policy regarding grades and grading systems is available at http://catalog.arizona.edu/2015-16/policies/grade.htm

**Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at** http://catalog.arizona.edu/2015-16/policies/grade.htm#I and http://catalog.arizona.edu/2015-16/policies/grade.htm#W, respectively.

**Schedule of Lectures**

**Tuesday 21 Aug Introduction, History**

Articles in “Past, Present and Future of Cochlear Implants” on D2L (Walzman and Roland Chapter 1,2,3)

**Tuesday 28 August Biophysics of electrical stimulation; Electrode design; surgery**

Articles in “Anatomy biophysics and physiology of electrical stimulation” on D2L
Articles on Implant, electrode design and development and surgery on D2L (Walzman and Roland Chapters 4, 9, 10, 11)

**Tuesday 4 Sept Speech Processing Strategies**

Articles on Speech Processing Strategies on D2L (Walzman and Roland Chapters 5,14)

**Tuesday 11 September Psychophysics of electrical hearing.**

Zeng, Chapter 7 (This will be distributed)

**Tuesday 18 Neurobiology of Deafness; Candidacy issues in infants and children**

Team assignments for problem-based learning activity to be presented on Tuesday October 2nd

Articles on Pediatric Candidacy on D2L (Walzman and Roland Chapter 2,3,4, 15, 16 and 22)

**Tuesday Sept 25th Candidacy issues in infants and children**

Problem-based learning activity team work and coaching

**Tuesday 2 October Prognosis and Outcomes: infants and children; Report on recent evidence base concerning age-of-implantation; Report on recent evidence base concerning outcomes in infants and children: Outcomes= language, speech production, academic achievement and social-emotional development/health related quality of life.**

Walzman and Roland Chapters 15 and 17

**Tuesday 9 October: Candidacy issues: post-lingual deafened adults; pre and post-assessment measures in adults.**

Articles on Candidacy issues on D2L
Articles on Outcomes in Adults D2L (Walzman and Roland Chapters 6,8)
Tuesday 16 October Catch Up. Introduction of Clinical Guidelines Project and Project Planning
See articles on D2L

Tuesday 23 October: Recorded lecture: Prognoses and outcomes: adults; non-traditional candidates
Walzman and Roland chapter 16

Meet to work on your clinical guidelines project(s)

Tuesday 30 October recorded lecture: Bi-modal and hybrid devices; bilateral implants
Articles on Bimodal stimulation on D2L
Articles on Bilateral implants on D2L
(Walzman and Roland Chapter 18)

Meet to work on your clinical guidelines project(s)

Tuesday 6 November Music Perception with Implants
Articles on Music Perception on D2L
(Walzman and Roland Chapter 19)

November 13: No class today (ASHA Convention)

Tuesday 20 Nov: Brainstem Implants; Bone Anchored Hearing Aid, Completely implantable hearing aid
Articles on Brainstem Implants on D2L
Articles on Bone-anchored hearing aids on D2L
Articles on other topics of interest

Tuesday 27 December Vestibular implants; implants for tinnitus treatment; future directions,

Articles on “other topics of interest” on D2L
Walzman and Roland Chapter 21, 23

Tuesday Dec 4 Clinical Guidelines Oral Presentations

Final Monday 12 December 6-8 p.m. Clinical Guidelines write-up is due by this time.

Classroom Behavior Policy
To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed.
Interaction, discussion, and questioning are very much encouraged.
Threatening Behavior Policy
The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.

Accessibility and Accommodations
Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact the Disability Resource Center (520-621-3268) to establish reasonable accommodations. For additional information on the Disability Resource Center and reasonable accommodations, please visit http://drc.arizona.edu.

If you have reasonable accommodations, please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.

Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

Code of Academic Integrity
Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.

The University Libraries have some excellent tips for avoiding plagiarism, available at http://www.library.arizona.edu/help/tutorials/plagiarism/index.html.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor’s express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

UA Nondiscrimination and Anti-Harassment Policy
The University is committed to creating and maintaining an environment free of discrimination; see http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy.

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Additional Resources for Students
UA Academic policies and procedures are available at http://catalog.arizona.edu/2015-16/policies/aaindex.html

Student Assistance and Advocacy information is available at http://deanofstudents.arizona.edu/student-assistance/students/student-assistance

Confidentiality of Student Records
http://www.registrar.arizona.edu/ferpa/default.htm
Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.