Course Objectives

Students will explore otoacoustic emissions (OAEs), focusing on both theoretical and practical issues. Specific course objectives are listed below.

1) Become familiar with important researchers and research papers related to OAEs.
2) Learn the anatomy and physiology thought to underlie OAE production.
3) Understand and be able to explain current theories of OAE generation.
4) Explore a variety of OAE measurement, analysis, and calibration techniques.
5) Explain what has been learned in a class presentation.

Course Requirements

This course is intended for graduate students in Audiology and Hearing Science (AuD and PhD). It is assumed that students will enter the class with a solid understanding of acoustics, audition, auditory anatomy, and auditory physiology. It is also assumed that students possess basic signal processing and Matlab programming skills.
**Texts**

Nine research articles comprise the required reading for this class. These articles are listed in the tentative outline at the end of this document. They should be available online through the university libraries. Electronic copies are also available from the instructor.

Additional reading will also be necessary in order to design and carry out the OAE projects. The specific articles that are needed will depend on the project chosen by the students.

There is no required textbook; however, the following text is recommended for background and supplementary information: *Otoacoustic Emissions: Clinical Applications* edited by Martin S. Robinette and Theodore J. Glatke. The most recent edition is the Third Edition, copyrighted 2003. ISBN 978-3-13-103713-8.

**Course Format**

The course will be taught in a seminar format, with class held on Tuesday evenings. The seminar format is one in which a majority of the information will be obtained through reading and discussing original research articles and completing projects, rather than through lecture. Students are expected to participate in the process of instruction and learning by reading the assigned papers, contributing to class discussion, and showing initiative in researching, designing, and carrying out an OAE project. Students will be divided into small groups by the instructor. Students will work in these groups to lead discussions of articles and to carry out OAE projects.

During the middle 6 weeks of the course, groups will focus on carrying out their OAE projects. We may meet a class during this time, depending on need. On weeks we do not meet as a class, each group is expected to meet with the instructor for help and guidance in carrying out their project.

**Homework Expectations**

The general policy of the University of Iowa and the Department of Communication Sciences and Disorders is that for each semester hour of credit that a course carries, students should expect to spend approximately two hours per week outside of class preparing for class sessions. This is a two credit hour course, and course assignments have been designed to require an average of 4 hours per week in out-of-class preparation.

1) **Leading Discussions**: The required background readings will be discussed during the first 5 weeks of the course. Each group will be assigned a week to lead the discussion. Students may need to seek additional resources to effectively lead the discussion and should consult the instructor to help determine what, if any, additional information should
be presented to the class. Students should work to ensure that each member of the group takes an active role in leading the discussion.

2) Participation: Although one group will have primary responsibility for leading the discussion for a particular set of papers, all students are expected to read all of the papers and participate in the discussion.

Important: The nine required readings are seminal papers by some of the most respected researchers in OAE and auditory research. They contain technical information and concepts which will be new to most students. They typically cannot be well-understood based on a single, quick read. Please spend the time required to read the papers thoroughly and to understand their main concepts, arguments, and weaknesses. You will probably not understand everything in every paper—that is OK. Coming to the discussion prepared with good questions is encouraged.

3) Project & Report: Each group will design and carry out an OAE project. The project should include researching the theoretical background, developing an appropriate measurement paradigm, creating stimuli, measuring OAEs from the ears of each member of the group, analyzing the raw data using appropriate signal processing, and interpreting the results. The topic or topics of the project will be selected by the group, in consultation with the instructor. During the first 5 weeks of the course, each group should decide on one or more topics for their OAE project and complete a written proposal for carrying out the project. This proposal should be created in consultation with the instructor. The project should be large enough to occupy the full semester, but small enough to be completed by the end of the semester.

Each group will present their project to the rest of the class during the last weeks of the semester. The presentations should be in Power Point format, and electronic copies will be made available to the rest of class. All group members should be involved in making the presentation and delivering it to the class.
List of Possible Topics for Projects (or come up with your own):

Separating coherent reflection and distortion sources
Two-source interference
Using OAEs to infer cochlear delay and tuning
Using OAEs to predict audiometric thresholds
Using OAEs to measure efferent suppression
Measurement of high-frequency OAEs
Using OAEs to measure middle-ear transfer functions
OAEs and ototoxicity or NIHL
OAE calibration issues
Comparison of OAE measured using linear and nonlinear techniques
Comparison of clinic and laboratory OAE measurements
OAEs and Auditory Processing Disorders
Measuring medial olivocochlear efferent activation using OAEs
Contamination of OAEs by low-level acoustic reflex activation
OAE growth functions
Comparison of SFOAE, DPOAE, SOAE, SSOAE, TEOAE
Replicability / reliability of OAE measurements

Grades

The plus/minus system of grading as described by the College of Liberal Arts and Sciences will be used for students taking the course for a letter grade. Discussion leadership will count towards 10% of the final grade. Participation in class discussion will count towards 10% of the final grade. The project and presentation will each count toward 40% of the final grade. The course may also be taken as a Pass/Fail option.

KASA

The information included in this course covers the following categories on the KASA (Knowledge And Skills Acquisition for certification in Audiology): B4, B10, B13, D7. Please talk to your advisor if you have questions about what this is and how it applies to you.
### Tentative Outline

<table>
<thead>
<tr>
<th>Week #</th>
<th>Topic</th>
<th>Date</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>Course Overview</td>
<td>Jan 20</td>
<td>Assign groups, discuss potential topics, general overview of OAEs</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Learn about OAE hardware and software in the lab</td>
<td>Feb 10</td>
<td></td>
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Two-Source Interference (Group #4: Sterling, Kristin, Amanda)


Project Proposals Due

7
Mar 3 Work on projects
(March 4-7, American Auditory Society)

8
Mar 10 Work on projects

Mar 14-22 SPRING BREAK

9
Mar 24 Work on projects

10
Mar 31 Work on projects
(April 1-4, American Academy of Audiology)

11
Apr 7 Work on projects

12 Student Project Presentations
Apr 14 Group #1: Ian, Laural, Julie

13 Student Project Presentations
Apr 21 Group #3: Ben, Abbie, Laura

14 Student Project Presentations
Apr 28 Group #2: James, Kenny, Robin

15 Student Project Presentation
May 5 Group #4: Sterling, Kristin, Amanda

May 11-15 Final Exam Week  (There is no final exam for this class.)
The College of Liberal Arts and Sciences Policy and Procedures

Administrative Home of the Course
The College of Liberal Arts and Sciences is the administrative home of this course and governs such academic matters as the add/drop deadlines, the second-grade-only option, issues concerning academic fraud or academic probation, and how credits are applied for various graduation requirements. Different colleges may have different policies. Students with questions about these or other CLAS policies should speak with an academic advisor or with the staff in 120 Schaeffer Hall. Also see the CLAS Academic Handbook: www.clas.uiowa.edu/students/academic_handbook/index.shtml

Student Attendance
As specified in the University’s Operation Manual, students are be permitted to make up examinations missed because of illness, mandatory religious obligations, certain University activities, or unavoidable circumstances. Students who miss quizzes or assignment deadlines for other reasons will not be allowed to make them up.

Academic Fraud
Plagiarism and any other activities that result in a student presenting work that is not his or her own are academic fraud. Academic fraud is reported to the departmental DEO and then to the Associate Dean for Academic Programs and Services. See Academic Fraud at www.clas.uiowa.edu/students/academic_handbook/ix.shtml for the complete policy.*

Making a Suggestion or a Complaint
Please feel free to first bring any issues to the instructor. If for any reason you do not wish to do so, you may contact Paul Abbas, the Department Chair (119 SHC, 319-335 - 8733, paul-abbas@uiowa.edu).

Students have the right to make suggestions or complaints and should first visit with the instructor, then with the course supervisor, and next with the departmental DEO. For more information visit www.clas.uiowa.edu/students/academic_handbook/ix.shtml#5

Accommodations for Disabilities
It is my responsibility as the instructor of this course to make reasonable accommodations for any student with physical, mental, or learning disabilities. I would like to hear from anyone who has a disability which may require seating modifications, testing accommodations, or accommodations of other class requirements, so that appropriate arrangements may be made. Please contact me during my office hours.

A student seeking academic accommodations registers with Student Disability Services and meets with a SDS counselor who reviews documentation and determines eligibility for services. A student approved for accommodations should meet privately with the course instructor to discuss particular arrangements. Please visit Student Disability Services at www.uiowa.edu/~sds/
**Understanding Sexual Harassment**

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. Visit the sexual harassment awareness site at [www.sexualharassment.uiowa.edu/](http://www.sexualharassment.uiowa.edu/) for definitions, assistance, and the full University policy.

**Reacting Safely to Severe Weather**

If severe weather is indicated by the UI outdoor warning system, class members will seek shelter in the innermost part of the building, if possible at the lowest level, staying clear of windows and of free-standing expanses which might prove unstable. The class will resume after the severe weather has ended. See the Operations Manual section 16.14. i.

*The CLAS policy statements have been summarized from the web pages of the College of Liberal Arts and Sciences and the UI Operations Manual.*