Auditory System: Neur 301, Fall 2016

Class Time: Tuesday 7:00-10:00 pm; RH 104

Contact Info: Megan D. Gall; OH A52; megall@vassar.edu; phone: x7115
Drop in office hours: Wednesday and some Fridays 12-1:15 at the Bridge Building Café.
Other good times to meet with me: By appointment in my office (Wednesday 9-10:15, usually 3:15-5). I'm also happy to chat over lunch of dinner at ACDC or the Retreat. Monday and Thursdays are spent with my research students and I may or may not be available by appointment on those days.

Course Materials

Text: No required textbook. We will be reading chapters from a variety of volumes in the Springer Handbook of Auditory Research series. We will also be reading primary literature. Be sure to check Moodle – readings will be posted as PDFs.

Course Description:

In this course we will use audition as a model for understanding how neurobiology and behavior are connected. We will take a comparative approach, examining similarities and differences across different taxa. We will begin by discussing the structure and evolution of the peripheral and central auditory system. We will then discuss important aspects of auditory processing (e.g. frequency sensitivity, frequency and temporal resolution, auditory localization), the mechanisms of their transduction, and how variability in the evolutionary significance of these functions influence the anatomical structure of auditory systems in different taxa. Following this neuroscience introduction, we will investigate the importance of audition in behavior (communication, predator and prey detection, dealing with noise) and how behavior can affect auditory neurobiology. Finally, we will discuss clinical pathologies in the human auditory system, how pathologies affect behavior, and how basic research is informing our approach to diminishing the effects of these pathologies.

Course Goals:

1. Understand and explain the fundamental principles and mechanisms of auditory perception.
2. Understand the relationship between mechanism, development, function, and evolution of peripheral and central auditory structures.
3. Critically analyze and present information from primary literature.
4. Convey information about auditory processing in written and oral formats at a high level.
5. Become comfortable *not* knowing the answer - scientists investigate the unknown!

GRADING

Participation / Reading Guides	25
Primary Literature Presentation and Reading Guide	10
Pathology Report (10) and Presentation (5)	15
Mid-term assignment (Take Home)	20
Final Exam (Oral)	30
Total	**100**

Auditory System: Neur 301, Fall 2016

TENATIVE SCHEDULE (note: the class schedule will be available via Moodle. It will be updated as needed to reflect any changes to the schedule)

Week	Class Session	In-class
Week 1	Overview of the Auditory System, The Outer Ear (in depth), Sound Localization I	Background Review Paper Discussion
Week 2	The Middle Ear – Acoustic Coupling, Frequency Limits / Audiograms	Background Review Paper Discussion
Week 3	The Inner Ear – Comparative Structure and Frequency Maps	Background Review Paper Discussion
Week 4	The Inner Ear – Hair Cell Structure and Function	Background Review Paper Discussion
Week 5	The Inner Ear – Electrical vs. Mechanical Tuning, Frequency and Temporal Resolution	Background Review Paper Discussion
Week 6	The Inner Ear – Cochlear Amplifier / The Active Process	Background Review Paper Discussion
Week 7	Auditory Nerve – Tuning and Functions	Background Review Student Led Discussion**
Week 8	**FALL BREAK**	**NO CLASS**
Week 9	Evolution of Central Processing	Background Review Student Led Discussion**
Week 10	Auditory Brainstem – Echolocation	Background Review Student Led Discussion**
Week 11	Auditory Midbrain – Hormones, Experience and Plasticity	Background Review Student Led Discussion**
Week 12	Auditory Forebrain – Music Perception	Background Review Student Led Discussion**
Week 13	The Integrated Auditory System – Learning and Communication	Background Review Student Led Discussion**
Week 14	How Things Go Wrong – Clinical Pathologies in the Auditory System	Clinical Presentations Report Due
Week 15	No Class : Tuesday = Thursday	Think about final exam!

*We are going to be reading a wide variety of chapters and papers. Rather than have them all listed here, you should also consult Moodle for all readings assigned for each class.

**I have suggested reading (and posted it on Moodle) for the student led paper discussion. However, students may choose to replace or supplement these readings with their own paper selections. If you would like to change the paper selection for your presentation, please run it by me at least one week in advance of your class period.

Auditory System: Neur 301, Fall 2016

Class Participation

We will spend a great deal of time discussing ideas in this course; therefore, participation is critical for full engagement in the course. I expect each student will attend and engage actively and thoughtfully in discussion and activities. You may make up one class session (see make up policy below). For each additional class you miss your maximum possible grade with be lowered a letter grade.

Discussion preparation

To ensure that everyone has ample to time to digest and prepare thoughtful comments about the reading, there will be short assignments related to the readings for each class. Assignments are posted on Moodle. I will ask you to complete and turn in two of these assignments (your choice) for our assessment of the course. These two will not be graded, but will be required to pass the class. If everyone comes to class prepared, these will simply be for you to prepare for discussion (i.e. you all get full participation credit) and for our assessment of the course. However, I may choose to grade these assignments if participation or preparedness seems to be flagging.

Presentation / Discussion Lead

In the second half of the course, pairs of students will present the background reading and lead discussion on the primary literature papers. In addition to leading the discussion, student should create a reading guide and/or pre-class activity that will help people work through the readings. These must be turned in one week before the class discussion, to allow other students time to complete them. You should also meet with me one week prior to your presentation to go through the reading and make sure you understand them thoroughly. If you do not meet me with me ahead of time with your printed lesson plan, your maximum possible grade for the discussion cannot exceed a B.

Pathology Report

During the semester we will learn about the structure and functions of the healthy auditory system. However, in human populations we are often extremely interested in understanding what happens when there is dysfunction in the auditory system. In fact, there is an entire branch of the NIH devoted to the study of Deafness and Communication Disorders (https://www.nidcd.nih.gov/). To end our semester, we will use what we have learned about the healthy auditory system to investigate different disorders that can lead to hearing loss or communication difficulties. Here you and a partner will choose a disorder and prepare a report on (1) the symptoms of the disorder (2) the putative mechanism of the disorder (3) effects on other areas of the auditory system (4) current treatment options and (5) current and future research directions. In addition to this written report, you will give a presentation to the class on the final day of the class.

Mid-term Exam

The mid-term exam will be a synthetic take-home exam that will cover both the chapters and papers that we have read. The exam will consist of several long-form essay questions. We will discuss the due date of the exam in class, so we can find a time that won't conflict too much with other class work.

Final Exam

The final exam for this course will be an oral "take home" final. Please schedule a time no later than the third day of finals week to take your final. You may elect to take your exam during the last week of class or reading days, if you wish. All exams will take place in my office (OH A52). You should expect the oral examination to take 30-45 minutes.

Auditory System: Neur 301, Fall 2016

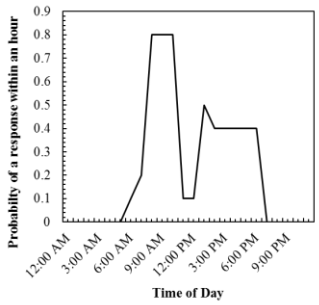
The reading guides that you have used during the semester are an excellent resource for studying for this exam. I will also provide you with a sample of the types of questions I may ask you during the exam.

Make up policy: You will only be allowed to make up one class session for which you have an excused absence by completing a reading guide for that class session. This must be turned in within one week of the class session that was missed.

Late Policy: There will be a 5% penalty for each 24 hour period that an assignment is turned in late.

Originality and Attribution: You are responsible for following the procedures detailed in the handbook, Originality and Attribution: A Guide for Student Writers at Vassar College. If you have any questions about attribution, you must see me well before an assignment is due.

E-mail Policy (Monday through Friday):



Phones should not be used in class. Phone use may result in the loss of participation points. Laptops are allowed in class, but I reserve the right to ban their use on an individual or class basis if they are being used for non-class activities (e-mail, facebook, etc.) or distracting other students.

ACCOMMODATIONS:

Academic accommodations are available for students registered with the Office for Accessibility and Educational Opportunity. Students in need of ADA/504 accommodations should schedule an appointment with me early in the semester to discuss any accommodations for this course that have been approved by the Office for Accessibility and Educational Opportunity, as indicated in your AEO accommodation letter.

Auditory System: Neur 301, Fall 2016

Grades:

% Points	Final Grade
95-100:	A
91-94.99:	A-
87-90.99	B+
83-86.99	B
80-82.99	B-
77-79.99	C+
72-76.99	C
70-71.99	C-
67-69.99	D+
60-66.99	D
0-59.99	F

From the Vassar Catalogue

A indicates achievement of distinction. It involves conspicuous excellence in several aspects of the work.
B indicates general achievement of a high order. It also involves excellence in some aspects of the work, such as the following:

- Completeness and accuracy of knowledge
- Sustained and effective use of knowledge
- Independence of work
- Originality

C indicates the acceptable standard for graduation from Vassar College. It involves in each course such work as may fairly be expected of any Vassar student of normal ability who gives to the course a reasonable amount of time, effort, and attention. Such acceptable attainment should include the following factors:

- Familiarity with the content of the course
- Familiarity with the methods of study of the course
- Evidence of growth in actual use both of content and method
- Full participation in the work of the class
- Evidence of an open, active, and discriminating mind
- Ability to express oneself in intelligible English

C–, **D+**, and **D** indicate degrees of unsatisfactory work, below standard grade. They signify work which in one or more important respects falls below the minimum acceptable standard for graduation, but which is of sufficient quality and quantity to be counted in the units required for graduation. Work evaluated as **F** may not be counted towards the degree.