



Psychology 471

Auditory Cognitive Neuroscience

Fall 2014

**Instructor:** Suzanne Curtin

**Lecture Location:** SH 280

**Phone:** 403-220-7670

**Lecture Days/Time:** T/R 12:30 – 1:45pm

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**Office:** A260

**Office Hours:** Mondays 11-12

### Course Description and Goals

This course will take a multidisciplinary approach to understand the neural systems that contribute to auditory perception, using music and speech as domains of inquiry. We will explore this from an **auditory cognitive neuroscience** perspective. Students will master topics in acoustics, psychophysics, cognitive psychology, neurophysiology, and neuropsychology. Hands-on exercises in sound manipulation and experimentation also will constitute a means of learning about auditory processing. Throughout, the focus will be upon understanding general cognitive and perceptual challenges in perceiving and producing complex sounds like speech and music.

- In this course, we will use music and speech as a means of understanding auditory processing from a neuroscience perspective.
- A primary goal is intellectual synthesis. Strive to organize disparate facts into coherent wholes.
- Learn foundations of acoustics, sound, and auditory processing.
- Think about the broad theoretical questions and about research methods available to address these questions.
- Review the literature, read articles and synthesize the material, thinking critically about scientific information.
- Develop your scientific writing skills.
- Prepare a coherent thesis and argue for it with citations from the scientific literature.

### Prerequisites

Psyc 312 – Experimental Design and Quantitative Methods

Psyc 369 – Sensation and Perception

### Required Text

Schnupp, J., Nelken, I., & King, A. (2012). *Auditory Neuroscience: Making Sense of Sound*. MIT Press: Cambridge, MA.

### Evaluation

**Exam 1 (25% of final grade; Oct 02):** will cover material from Sept 9 – Sept 30.

**Exam 2 (25% of final grade; Nov 20):** will cover material from Oct 7 – Nov 13.

Exams will be short answer and essay style questions. Material from lectures, discussions, and hands-on exercises (labs) will be covered. No study aids will be permitted during exams.

### **Hands-On Exercises (labs; 30% of final grade – 10% each)**

Three exercises will be completed when we visit the computer lab (see schedule). They include manipulating sound files and creating acoustic stimuli. See schedule below for details. All exercises will be uploaded to D2L using the digital drop box. **No late exercises will be accepted.**

### **Final Review Paper (20% of final grade; due 12/04/14 in class)**

At the end of the semester, you will submit a paper reviewing a research topic relevant to the course goals. Potential topics will be provided at the beginning of the course. You may use this as an opportunity to investigate a topic in auditory processing that we have not discussed in class or to investigate more deeply one of the topics of the course; you should follow your own interests. **No late papers will be accepted.**

#### **Information about review paper:**

- Strive to make this a creative synthesis of some topic of research related to auditory processing from a cognitive neuroscience perspective.
- 10-12 double-spaced pages
- Fully referenced with >10 sources
- Structure your paper in the style of a review article (see *Nature Neuroscience Reviews*, *Trends in Cognitive Sciences*, etc)
- Highlight the major points of debate surrounding the issue
- Note the open questions for future research
- Indicate the ways in which questions are being addressed

### **Department of Psychology Grade Distribution Policy**

The distribution of grades in Psychology courses (the percentage of A grades, B grades, etc.) will be similar to the distribution of grades in other courses in the Faculty of Arts. The Department monitors the grade distributions of 200-, 300-, and 400-level courses in the Faculty to ensure that the grade distributions in Psychology courses are comparable. Based on these reviews, students can expect that 1) up to 30% of grades in 200- and 300-level psychology courses will be “A” grades (A+, A, and A-), and 2) up to 40% of grades 400-level psychology courses will be “A” grades.

### **Department of Psychology Criteria for Letter Grades**

Psychology professors use the following criteria when assigning letter grades:

**A+ grade: *Exceptional Performance.*** An A+ grade indicates near perfect performance on multiple choice and short answer exams. For research papers/essays/course projects/presentations, an A+ grade is awarded for exceptional work deserving of special recognition and is therefore not a common grade.

**A, A- Range: *Excellent Performance.*** Superior understanding of course material. Written work is very strong in terms of critical and original thinking, content, organization, and the expression of ideas, and demonstrates student’s thorough knowledge of subject matter.

B Range: *Good Performance*. Above average understanding of course material. Written work shows evidence of critical thinking and attention to organization and editing but could be improved in form and/or content.

C Range: *Satisfactory Performance*. Adequate understanding of course material. Knowledge of basic concepts and terminology is demonstrated. Written work is satisfactory and meets essential requirements but could be improved significantly in form and content. Note: All prerequisites for courses offered by the Faculty of Arts must be met with a minimum grade of C-.

D range: *Marginally meets standards*. Minimal understanding of subject matter. Written work is marginally acceptable and meets basic requirements but requires substantial improvements in form and content. Student has not mastered course material at a level sufficient for advancement into more senior courses in the same or related subjects.

F grade: *Course standards not met*. Inadequate understanding of subject matter. Written work does not meet basic requirements. Student has not demonstrated knowledge of course material at a level sufficient for course credit.

### Grading Scale

A+	96-100%	B+	80-84%	C+	67-71%	D+	54-58%
A	90-95%	B	76-79%	C	63-66%	D	50-53%
A-	85-89%	B-	72-75%	C-	59-62%	F	0-49%

In this course there will be no rounding up of final grades, especially in light of the opportunities students have to increase their final grade via research participation.

### Tentative Lecture Schedule

Date	Topic	Readings	Due /Important Dates
<b>Week 1</b>	<b>Introduction</b>		
T Sep 9	Course Overview		
R Sep 11	What is ACN?		
<b>Week 2</b>	<b>What is sound?</b>	Pages 1-50	
T Sep 16	Simple Harmonic Motion Mode of Vibration Fourier Analysis Visualizing Sound Impulse Responses		
R Sep 18	Complex Sounds Sound Propagation Sound Intensity		
F Sep 19			Last day to drop Fall Term half courses. No refunds for Fall Term half courses after this date.
<b>Week 3</b>	<b>The Ear</b>	Pages 51-92	
M Sep 22			Last day to add or swap Fall Term

			half courses. Last day for change of registration from audit to credit or credit to audit.
T Sep 23	Sound Capture & Inner Ear Hair Cells Outer Hair Cells		
R Sep 25	Neural Firing Patterns Central Auditory Pathway		
F Sep 26			Fee payment deadline for Fall Term full and half courses.
<b>Week 4</b>			
T Sep 30	<b>LAB</b> (hands-on)		<b>Meet in SS018 Section 3</b>
R Oct 2	<b>Exam 1</b>		
<b>Week 5</b>	<b>Periodicity and Pitch</b>	Pages 93-138	
T Oct 7	Periodicity Psychophysics Pitch and Scales Perception Non-human		
R Oct 9	Algorithms Periodicity Encoding Paradoxes		
<b>Week 6</b>	<b>Voice and Music Acoustics</b>		
M Oct 13			Thanksgiving Day, University closed No lectures.
T Oct 14	Speech and Singing		
R Oct 16	Music		
<b>Week 7</b>	<b>Speech</b>	Pages 139-175	
T Oct 21	Categorical Perception Subcortical Representations		
R Oct 23	Cortical Areas Representation in PAC Processing		
<b>Week 8</b>	<b>Music</b>		
T Oct 28	Perception		
R Oct 30	Psychological function		
<b>Week 9</b>	<b>Neural Basis</b>	Pages 176-221	
T Nov 4	Localization		
R Nov 6	Encoding		
<b>Week 10</b>	<b>Auditory Scene Analysis</b>	Pages 123-267	
T Nov 11	No lecture		Remembrance Day (Observed).
Nov 8-11	Reading Days. No lectures.		
R Nov 13	Segregation and Grouping		
<b>Week 11</b>			
T Nov 18	<b>Lab</b> (hands-on)		<b>Meet in SS018 Section 3</b>
R Nov 20	<b>Exam 2</b>		
<b>Week 12</b>	<b>Development, Learning,</b>	Pages 270-319	

	<b>Plasticity</b>		
T Nov 25	Hearing Development Early Experience		
R Nov 27	Plasticity		
<b>Week 13</b>	<b>Wrap-up</b>		
T Dec 2	<b>Lab 3</b> (hands-on)		<b>Meet is SS018 Section 3</b>
R Dec 4	Closing remarks		<b>Final Papers Due</b>
F Dec 5			Last day to withdraw with permission from Fall Term half courses.
Dec 8-18			Fall Term Exam Period.

### Reappraisal of Grades

A student who feels that a piece of graded term work (e.g., term paper, essay, test) has been unfairly graded, may have the work re-graded as follows. The student shall discuss the work with the instructor within 15 days of being notified about the mark or of the item's return to the class; no reappraisal of term work is permitted after the 15 days. If not satisfied, the student shall immediately take the matter to the Head of the department offering the course, who will arrange for a reassessment of the work within the next 15 days. The reappraisal of term work may cause the grade to be raised, lowered, or to remain the same. If the student is not satisfied with the decision and wishes to appeal, the student shall address a letter of appeal to the Dean of the faculty offering the course within 15 days of the unfavourable decision. In the letter, the student must clearly and fully state the decision being appealed, the grounds for appeal, and the remedies being sought, along with any special circumstances that warrant an appeal of the reappraisal. The student should include as much written documentation as possible.

### Plagiarism and Other Academic Misconduct

Intellectual honesty is the cornerstone of the development and acquisition of knowledge and requires that the contribution of others be acknowledged. Consequently, plagiarism or cheating on any assignment is regarded as an extremely serious academic offense. Plagiarism involves submitting or presenting work in a course as if it were the student's own work done expressly for that particular course when, in fact, it is not. Students should examine sections of the University Calendar that present a Statement of Intellectual honesty and definitions and penalties associated with Plagiarism/Cheating/Other Academic Misconduct.

### Academic Accommodation

It is the student's responsibility to request academic accommodations. If you are a student with a documented disability who may require academic accommodation and have not registered with the Disability Resource Centre, please contact their office at 403-220-8237. Students who have not registered with the Disability Resource Centre are not eligible for formal academic accommodation. You are also required to discuss your needs with your instructor no later than 14 days after the start of this course.

### **Absence From A Test/Exam**

Makeup tests/exams are NOT an option without an official University medical excuse (see the University Calendar). A completed Physician/Counselor Statement will be required to confirm absence from a test/exam for health reasons; the student will be required to pay any cost associated with this Statement. Students who miss a test/exam have 48 hours to contact the instructor and to schedule a makeup test/exam. Students who do not schedule a makeup test/exam with the instructor within this 48-hour period forfeit the right to a makeup test/exam. At the instructor's discretion, a makeup test/exam may differ significantly (in form and/or content) from a regularly scheduled test/exam. Except in extenuating circumstances (documented by an official University medical excuse), a makeup test/exam must be written within 2 weeks of the missed test/exam.

### **Travel During Exams**

Consistent with University regulations, students are expected to be available to write scheduled exams at any time during the official December and April examination periods. Requests to write a make-up exam because of conflicting travel plans (e.g., flight bookings) will NOT be considered except under exceptional circumstances. Students are advised to wait until the final examination schedule is posted before making any travel arrangements.

### **Freedom of Information and Protection of Privacy (FOIP) Act**

The FOIP legislation disallows the practice of having student's retrieve tests and assignments from a public place. Therefore, tests and assignments may be returned to students during class/lab, or during office hours, or via the Department Office (Admin 255), or will be made available only for viewing during exam review sessions scheduled by the Department. Tests and assignments will be shredded after one year. Instructors should take care to not link students' names with their grades, UCIDs, or other FOIP-sensitive information.

### **Course Credits for Research Participation (Max 2% of final grade)**

Students in most psychology courses are eligible to participate in Departmentally approved research and earn credits toward their final grades. **A maximum of two credits (2%) per course, including this course, may be applied to the student's final grade. Students earn 0.5% (0.5 credits) for each full 30 minutes of participation.** The demand for timeslots may exceed the supply in a given term. Thus, students are not guaranteed that there will be enough studies available to them to meet their credit requirements. Students should seek studies early in the term and should frequently check for open timeslots. Students can create an account and participate in Departmentally approved research studies at <http://ucalgary.sona-systems.com>. The last day to participate in studies and to assign or reassign earned credits to courses is **Dec 5, 2014**

### **Evacuation Assembly Point**

In case of an emergency evacuation during class, students must gather at the designated assembly point nearest to the classroom. The list of assembly points is found at

<http://www.ucalgary.ca/emergencyplan/assemblypoints>

Please check this website and note the nearest assembly point for this course.

### **Student Organizations**

Psychology students may wish to join the Psychology Undergraduate Students' Association (PSYCHS). They are located in Administration 170 and may be contacted at 403-220-5567.

**Student Union VP Academic:** Phone: 403-220-3911

[suypaca@ucalgary.ca](mailto:suypaca@ucalgary.ca)

**Student Union Faculty Rep.:** Phone: 403-220-3913

[socialscirep@su.ucalgary.ca](mailto:socialscirep@su.ucalgary.ca)

### **Student Ombudsman's Office**

The Office of the Student Ombudsmen provides independent, impartial and confidential support for students who require assistance and advice in addressing issues and concerns related to their academic careers. The office can be reached at 403-220-6420 or [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca) (<http://www.su.ucalgary.ca/services/student-services/student-rights.html>).

### **Safewalk**

The safewalk program provides volunteers to walk students safely to their destination anywhere on campus. This service is free and available 24 hrs/day, 365 days a year.  
Call 403-220-5333.

### **Important Dates**

The last day to drop this course with no "W" notation and **still receive a tuition fee refund** is **Friday, September 19, 2014**. Last day for registration/change of registration is **Monday, September 22, 2014**. The last day to withdraw from this course is **December 5, 2014**.