## Date

Fall 2016

## Contact

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office: Couch Building — Room 205

office hours: Monday 4:30–5:30pm and by appointment

## 1. Credits and Hours

3 credit hours

Lecture: Monday and Wednesday, 3:05–4:25pm in Couch 102

## 2. Course Description, Objectives, and Outcomes

Introduction to the human perception of sound and music. This course covers the auditory system, psycho-acoustics, sound and music cognition, and music psychology. Assignments and projects provide hands-on experience with acoustic phenomena, auditory processing, and experimental design. Further, students will be able to apply this knowledge to the design and implementation of models of human sound perception in Matlab. Upon completion of the course, students will demonstrate:

1. knowledge of the physiology of the human ear and the properties and specifics of human auditory processing,
2. the ability to apply this knowledge to the design and implementation of algorithmic models of human sound perception,
3. the ability to plan and execute a scientific listening experiment, and
4. the ability to apply scientific reasoning to analyze data.

## 3. Prerequisites

CS 1301/CS 1315/CS 1371 and PHYS 2212 Intro Physics II

## 4. Procedures

Class will meet two times weekly, see Section 1. Attendance is expected but not factored into your grade.

## 5. Course Materials

### 5.1. Recommended Reading

Brian CJ Moore (2013), *An Introduction to the Psychology of Hearing: Sixth Edition*, 6th Edition, Academic Press, ISBN: 978-9004252424.

### 5.2. Software

The assignments and project work will be done in Matlab. Please note the following license information:

[www.matlab.gatech.edu](http://www.matlab.gatech.edu). Other tools and programming languages can be used if approved by the instructor.

## 6. Undergraduate vs. Graduate Students

Both undergraduate and graduate students will be attending this class. In addition to having the same workload as undergraduate students, graduate students will:

• Submit a final paper, and

• Receive an additional question on each assignment.

The final paper will utilize a 6-page conference style format. A pre-defined style template will be provided that includes: 1) describing the final project, 2) delineating the research question, 3) detailing the experiment design, and 4) documenting the related work and result. There will also be a presentation and discussion of the conclusions.

The four assignments will focus on implementing algorithmic models of human sound and music perception (i.e., models for pitch, loudness, masking, and spatial hearing). The additional assignment questions will require the graduate students to discuss limitations of the implemented models and to suggest modifications that might improve the accuracy of the implemented model.

## 7. Method of Evaluation

The final project is a team effort. Group size will be about four students. The grades for paper, final presentation and project will all be per group. The assignments will be done and graded individually. The overall grade consists of:

• assignments: 30%

• mid-term presentation: 10%

• final presentation: 20%

• final project: 40%

All assignments, papers, presentations and tests will be graded by points. The final grade for the course will be determined by dividing the total points earned by the number of points possible for each of the categories listed above. These numbers will be converted into a grade according to the following scale:

• *A*=100−90%

• *B*=89−80%

• *C*=79−70%

• *D*=69−60%

• *F*=59% and below.

All grades except the grades for the assignments are **per group**. Students are encouraged to support each other with both the assignments and project work, but each submission has to be clearly executed by the individual/group being graded. More specifically, two or more individuals/groups handing in the same code/answers will be reported for academic misconduct.

## 8. Grading Policies

Homework assignments and the final project paper are due **ON THE DUE DATE**. The due date will be announced per assignment, but will usually be the following Monday on 3:05pm. A penalty of **ten points per day** will be applied to all late assignments and late project papers. Documented illnesses and family emergencies are excepted, of course. Quizzes and exams cannot be made up unless you have a valid, documented excuse.

## 9. Course Outline

The class will be structured into three parts: the lecture, the assignments, and the project work. The tentative schedule, subject to change, for the assignments is:

• Assignment 1: assigned in week 4, due in week 7.

• Assignment 2: assigned in week 7, due in week 10.

The topics for the project have to be approved by the instructor. The second half of the semester will focus on the listening tests for the projects rather than assignments.

• Week 1 (Aug 18): Introduction / Sound & Sound Waves

• Week 2 (Aug 25): Signals and Fourier Analysis

• Week 3 (Sep 1): Auditory System

• Week 4 (Sep 8): Loudness

• Week 5 (Sep 15): Masking

• Week 6 (Oct 13): Experimental Design

• Week 7 (Sep 22): Pitch

• Week 8 (Sep 29): Temporal

• Week 9 (Oct 6): Mid-term Project Presentation

• Week 10 (Oct 13): Timbre

• Week 11 (Oct 20): Spatial Hearing

• Week 12 (Oct 27): Non-linearities

• Week 13 (Nov 3): Expectation

• Week 14 (Nov 10): Emotion

• Week 15 (Nov 17): Performance

• Week 16 (Nov 24): Project Work

• Week 17 (Dec 1): Project Presentations

## 10. Academic Integrity

Students must do their own work on assignments, projects, and tests unless collaboration is previously specified and approved by the instructor. Students caught cheating will receive zero credit for that assignment/quiz/test and may be subject to further sanctions through the Office of Student Integrity. Students are expected to abide by the Georgia Tech Honor Code and avoid any instances of academic misconduct, including but not limited to:

• Possessing, using, or exchanging improperly acquired written or oral information in the preparation of a paper or for an exam.

• Substitution of material that is wholly or substantially identical to that created or published by another individual or individuals.

• False claims of performance or work that has been submitted by the student.

Please refer to the published Georgia Institute of Technology Academic Honor Code for further information: [www.deanofstudents.gatech.edu/integrity/policies/honor\_code.html](http://www.deanofstudents.gatech.edu/integrity/policies/honor_code.html).

## 11. Statement regarding Students with Disabilities

In accordance with the Americans with Disabilities Act, students with bona fide disabilities will be afforded reasonable accommodation. The ADAPTS Office will certify a disability and advise faculty members of reasonable accommodations. The web site for a student requesting accommodation is:

[www.adapts.gatech.edu/faculty\_guide/sturespon.htm](http://www.adapts.gatech.edu/faculty_guide/sturespon.htm).