

3D Audio

CIS 4930/6930

[3 Credit Hours]

Spring 2018

Course Information:

Time and Place:	Tuesday - Periods 8 - 9 (3:00 - 4:55) Thursday - Period 9 (4:05-4:55) AND 0134
Professor:	Dr. Kyla McMullen [drkyla@ufl.edu]
Graduate TA:	Mr. Ziqi Fan [fanzq1991@ufl.edu] Tuesday - 2:00 - 3:00 (Location TBD) Thursday - 3:00 - 4:00 (Location TBD)
Professor Office Hours:	Thursday - 5:00 pm - 6:00 pm AND 0134 or by appointment
Website:	http://elearning.ufl.edu

Course Goals & Objectives

Upon completion of this course, students will be able to:

- Understand and appreciate the role of audio in human-computer interaction
- Understand the physiological and computational aspects of rendering accurate spatial audio
- Understand the tradeoffs and challenges when designing 3D audio applications
- Design and develop a 3D audio application
- Learn and discuss current trends in 3D audio research
- Develop presentation and writing skills, as evidenced through completed project milestones

Course Communications:

Please be sure to check the *Announcements* section of Canvas for any announcements related to the class. Announcements will also be given at the beginning of the class period. You are responsible for obtaining the information contained in the announcements at the beginning of the class period. Private questions should be emailed to the instructor (not using the Canvas

Messaging client), including **CIS4930** or **CIS 6930** at the start of the subject line. If there are general questions (related to a certain concept or technology) please post them in the “Discussions” section of the Course Website to be answered by Dr. McMullen or the TA.

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions, and chats. Any discourteous conduct will result in a loss of all class participation points and additional points at the discretion of the instructor. Please familiarize yourself with the following link.

<http://teach.ufl.edu/wp-content/uploads/2012/08/NetiquetteGuideforOnlineCourses.pdf>

Text and Course Materials:

There is no required textbook to purchase for the course (you’re welcome), as the readings will be taken from the technical handbook “*3D Sound for Virtual Reality and Multimedia*” (*3DS4VRAM*) and other relevant articles that will be provided by the instructor via Canvas. Readings should be completed **before** the class in order to facilitate discussion.

At least one homework assignment will involve the use of **MATLAB**. Prior MATLAB experience is NOT assumed or required. During class, you will be taught the elements that you will need to know in order to complete the homework. There are 3 ways to access MATLAB:

- Install it on your own computer from Mathworks, using the student license (\$99).
 - https://www.mathworks.com/academia/student_version.html
- Use the MATLAB installation on CISE Computers
 - <https://www.cise.ufl.edu/help/account#apply>
- Use the MATLAB Virtual Apps Installation
 - <https://apps.ufl.edu/>

You will also need a pair of headphones and a computing device with internet access to be able to listen to and create class material. There will be instances in which you will need to bring your laptop and headphones to class in order to listen to examples of the instructional material.

Instructional Methods

Since this course is largely project-driven, sufficient in-class time will be allocated for students to work on their projects in class and ask the instructor questions about the various techniques and technologies that are being used. Note: students are expected to work on the project outside of class as well.

Attendance Policy:

Regular and punctual attendance is required (unless prior notice is discussed with the professor). Prior notice consists of an email with attached documentation concerning the reason for absence (away game, doctor’s note, academic conference, court summons, etc). All absences must be accompanied with proper documentation to avoid grade penalty.

Attendance/Class Participation/Responses to Readings Policy

Every day, an assignment will be given at the beginning of class. Your completion of the assignment will count as your attendance for the day. Should you miss the exercise, without giving a documented reason to the instructor prior to class, your grade will be a zero. These exercises will be online so please bring **a computing device with internet access with which you can type.**

Make-up Policy

Late assignments and documents are **not** be accepted under any circumstances. In extremely rare circumstances (for example: a student has been sick for an extended period of time), late assignments and documents may be accepted, however proper documentation is required.

Regular extracurricular activity (e.g., participating in an out-of-town academic conference, away game) does not merit permission to submit late documents or assignments. If you are going to be away during a time in which an assignment is due, meet with the professor to **arrange for early submission of the assignment.**

University Policy on Accommodating Students with Disabilities: Students requesting accommodation for disabilities must **first register with the Dean of Students Office** (<http://www.dso.ufl.edu/drc/>). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. **You must submit this documentation prior to submitting assignments or taking the quizzes.** Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

University Policy on Academic Misconduct: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at <http://www.dso.ufl.edu/students.php>.

Grading Policies:

Final letter grades will be determined from the total average approximately as follows:

A	90-100%	C	70-73%
A-	87-89%	C-	67-69%
B+	84-86%	D+	64-66%
B	80-83%	D	60-63%
B-	77-79%	D-	57-59%
C+	74-76%	E	0-56%

The course grade will be calculated as follows:

Attendance/Class Participation /Responses to Readings	15%
Assignments	25%
Class Project	60%
Total	100%

The **Class Project** grade (from above) will be calculated as follows:

Project Proposal Presentation	5 %
Project Proposal Report	5 %
Midterm-Project Presentation	5 %
Midterm-Project Report	5 %
Final Project Presentation	5 %
Final Project Deliverable	15 %
Final Project Report	10 %
Peer Evaluation	10 %
Total	60%

One (1) “Attendance/Class Participation/Responses to Readings” grade can be dropped if you visit the **Career Resource Center** before January 30 to have your resume critiqued. In order to receive credit for this, you **must** submit the corrected version of your resume. If you have no missed “Attendance/Class Participation/Responses to Readings” grades, then the resume critique can count for 10 extra credit points added to any one (1) homework assignment.

Class Project:

In the course, each student will complete a group project in which they pick a user population (ex: visually impaired, children, elderly, musicians, etc.) and design a 3D audio scene to suit some need for that population. **Graduate students** will complete projects in pairs (2) and

undergraduate students may work in groups of 4. Groups must speak with the professor if they would like to mix graduate and undergraduate students in a group. Occasionally, if the project is of substantial rigor, undergraduate groups of 5 or graduate student groups of 3 may be allowed, however **prior approval from the professor or TA is required**.

Each project group will create a **Project Proposal Presentation** in which the project’s purpose is outlined. Each project group will also present their intermediary work to the class during the **Midterm Project Presentation**. Presentations will be in video form, lasting about 5-7 minutes. All videos will be viewed in class, following which, each project group will receive constructive project feedback from the class. Each person will give anonymous feedback for each group, via a web form. Note: you are required to bring a computer for these class periods. This exercise will count as your “Attendance/Class Participation/Responses to Readings” grade for the day.

Each Group will fill out a **Project and Peer Evaluation Form** at the end of the class. Your project grade will largely depend on your contribution to your group (translation: no coasting).

The Proposal, Midterm, and Final project guidelines will be posted on Canvas. Although this is a technical class, you will be expected to write all documents related to homework and assignments using good, clear, and polished English and grammar. If this will be a challenge for you, it would be beneficial to visit the Writing Center on campus prior to submitting your work.

For the **Final Project Presentation**, groups must demo their projects to the class and other invited individuals in an informal Demo Day, held in the Reitz Union. This class period will occur on the final Tuesday of the course (**April 24**).

Homework:

Various homework assignments will be assigned throughout the semester and posted on Canvas. The due date and time for each program, assignment or document will be specified in the assignment. Programs and assignments and documents are to be submitted electronically and are due by the specified time and date. Late assignments will be assigned a grade of 0.

Course Outline (subject to change, check regularly)

Week	Date	Topic(s)	Assigned Work	Work Due	Reading
1	1/9	Course Introduction	Syllabus Quiz, HW #1		
	1/11	Sound (theoretically)		Syllabus Quiz (Due 1/12)	<i>Andrew (2007)</i>
2	1/16	Sound in the Interface & Audio Interfaces	Proposal Presentation & Report	HW #1	
	1/18	In-class Work Day			
3	1/23	<i>*[tentative] Field Trip</i> (meet on-site)			<i>--none</i>



	1/25	Sound (digitally)	HW #2 (Group) - IRB etc		Bellotti (2002)
4	1/30	3D Audio Implementation	HW #3 - POC, User Study (Group)		Frauenburger (2007)
	2/1	3D Audio Cues (theoretically)			31-39 (3DS4VRAM)
5	2/6	Proposal Presentations	*bring your laptop today*	Proposal Presentation	
	2/8	Proposal Presentations (continued)	*bring your laptop today*	Proposal Report	
6	2/13	3D Audio Cues (digitally) & Group Meetings		HW #2 (Group)	
	2/15	Head-Related Transfer Functions (HRTFs)	Midterm Presentation & Report		Cheng (2001)
7	2/20	HRTF Measurement and Databases	HW #4 - Fun With HRTFs(group)		Algazi (2001)
	2/22	<i>In-class work day</i>		HW #3 - POC & User Study(group)	
8	2/27	Midterm Presentations		Midterm Presentation	
	3/1	Midterm Presentations (continued)		Midterm Report	
9	3/6	<p style="text-align: center;"> <i>Have a Great Spring Break</i>  </p>			
	3/8				
10	3/13	3D Audio Perception			
	3/15	Localization & Unity Plugin(perhaps)			
11	3/20	Binaural Recordings			
	3/22	Azimuth Estimation and Localization		HW#4 - Fun with HRTFs (group 3/17)	
12	3/27	HRTF Customization			Seeber & Fastl, 2003 Xu, 2007 Wan, 2014
	3/29	Project work day			
13	4/3	Virtual Sound Search and Training			
	4/5	Psychophysics Research Methods	HW #5 - User Study (group) HW #6 - Project Poster (group)		
14	4/10	Project Work Day			

	4/12	Sonification			<i>Nasir, Barrass, Woroll</i>
15	4/17	Final Presentations	Project and Peer Evaluation		
	4/19	Final Presentations			
16	4/24	Demo Day / Project Fair		HW #5 - User Study, HW #6 - Project Poster, Final Project Report & Deliverable Project and Peer Evaluation (4/26)	

For issues with technical difficulties for E-learning in Canvas, please contact the UF Help Desk:

- Learning-support@ufl.edu
- (352) 392-HELP - select option 2
- <https://lss.at.ufl.edu/help.shtml>

** Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from LSS when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST email your instructor within 24 hours of the technical difficulty.

Other resources are available at <http://www.distance.ufl.edu/getting-help> for:

- Counseling and Wellness resources
- Disability resources
- Resources for handling student concerns and complaints
- Library Help Desk support