

BASIC AUDIO SYSTEMS

Columbia College, Chicago

Audio Arts & Acoustics Department

Course Information

- **Course number:** 43-2110-03
- **Course title:** Basic Audio Systems
- **Credit hours:** 3
- **Class time:** Thursday, 12:30PM – 3:20 PM
- **Location:** Room 618 (33 E Congress), Columbia College Chicago, 60605

Instructor Information

- **Instructor:** Pantelis Vassilakis, Ph.D.
- **TA:** TBD
- **Phone:** 312-369-8800 (department)
312-369-8821 (Office line) - 773-750-4874 (Cell)
- **Address:** 33 E Congress, Suite 601
- **E-mail:** pvassilakis@colum.edu (**preferred means of communication**)
- **Office hours:** By Appointment, only
- **Instruction fees:** Money is used for consumable supplies and items which become the property of the student. The fees for this course are \$70.00

Text and References

Required:

- **Lecture Notes for Basic Audio Systems:** This book will be the primary text resource for the course and will be handed-out during the first class session
- **Additional printouts** provided in class.

Suggested:

- **Rane Pro Audio Reference:** This is a free download using the link shown on the “Links & Resources” handout (optional).
- **Getting Started with TINA-TI™:** This is a free download using the link shown on the “Links & Resources” handout (optional)
- Any or all of the pdf links shown on the “Links & Resources” handout: These are representatives of the wealth of information available on the topic of audio systems.
- Any useful reference resource that you can share with the rest of the class?

Handouts will be available on Moodle or through alternative means of e-delivery. Any additional materials will be provided in class.

As an Audio Arts & Acoustics major you are expected to be familiar with:

- “The Journal of the Audio Engineering Society”, Published by the Audio Engineering Society, (212) 661-8528. *A must-read especially if your primary interests are in audio and/or in signal processing. Contact the Columbia College Chicago AES student group for more information and why you should join. Online access available at <http://libguides.colum.edu/az.php> -> AES e-Library (Optional)*
- The Journal of the Acoustical Society of America”, Published by the Acoustical Society of America, (516) 576-2360. *THE reference in all aspects of acoustics. Heavy reading but this is the place where the latest research gets published. National ASA student memberships include online access to the journal. Contact the Columbia College Chicago ASA student group for more information and why you should join. <http://acousticalsociety.org> (Optional)*

Important Dates

For deadlines on adding, dropping, or withdrawing from courses and for other important Semester dates see: http://www.colum.edu/Administrative_offices/Records/Registration

Course Description

This course is part of a series of core curriculum courses that deal with fundamental technologies associated with audio systems and components. The course aims to strike a balance between theory, practical applications, and aesthetic appreciation using a structure that includes lectures, class-based activities, and cohort-based work outside of the classroom. Students must pass this course with a grade of C or better in order to continue in the concentration of their choosing. This course is supported by Supplemental Instruction Peer Study Groups. See www.colum.edu/si for days and times.

Course Rationale

Basic Audio Systems prepares the student for their concentration and elective coursework. In this course students will develop and apply college-level vocabulary, mathematics, and critical thinking skills in the context of audio equipment and technology. The major topics covered in the course are as follows:

- Microphones / Loudspeakers: technology, application, and operating principles
- Audio Signals: technology, measurement, and processing
- Critical evaluation of sound, signals, and equipment

Basic Audio System also introduces the students to some of the general concepts associated with circuit simulation using software tools.

Goals & Objectives

Students will work in cohorts and will learn from readings, watching source materials available from external sources, class demonstrations, group exercises, and lectures. At the completion of this course students will have:

- Gained an understanding of the theory associated with the operation of various audio transducers.
- Gained an understanding of the operation and limitations associated with specific signal processing methods
- Read and critically understood industry engineering specification sheets for various audio-related products.
- Gained an aesthetic appreciation for the assessment of various audio materials and products using methods that are appropriate for college-level work.

Grading Policies & Evaluation Procedures

This is a three (3) credit hour course. In order to assess the learning objectives, the following tools will be used during the semester:

1. There will be three (3) short examinations. Each examination will last about one (1) hour and will be worth 20% of the final grade. The examinations will use a multiple choice format.
2. There will be one comprehensive final examination. The final will be held during the last class session and will be worth 30% of the final grade. The final will use a multiple choice format.
3. The weekly activity reports will be graded on the basis of clarity and completeness and will be worth 10% of your grade.

The final grade for this class will be determined based on the following table:

90% ≤ A	74% ≤ C+ < 77%
87% ≤ A- < 90%	70% ≤ C < 74%
84% ≤ B+ < 87%	67% < C- < 70%
80% ≤ B < 84%	60% < D < 67%
77% ≤ B- < 80%	F < 60%

I: (incomplete – assigned in accordance with the College’s academic guidelines)

Attendance Policy

You are expected to attend and arrive on time for every scheduled class period. You are working with partners, so be an active part of your Cohort!

Academic Honesty

You are expected to abide by the College's policies on **academic honesty and integrity**, as outlined in the student handbook <http://students.colum.edu/handbook/entries/academic-integrity>. Violations include but are not limited to: cheating, plagiarism, fabrication, falsification or sabotage of research data, destruction or misuse of the College's academic resources, and alteration or falsification of academic records. Note that, while using a variety of resources to help you complete your assignments is not only encouraged but expected, copying them verbatim fails to communicate whether or not you have understood the materials, constitutes plagiarism, and is penalized.

Satisfactory Academic Progress

In the fifth week of the semester, your teacher will be asked to provide some early feedback on your academic performance to help the College identify students who may be falling behind and are at risk of not satisfactorily completing a course. This online Academic Progress Report (APR) will notify students in time to seek academic coaching or other assistance to improve their grade. The APR is necessary because new federal regulations require students who achieve less than a 2.0 GPA and/or don't complete two-thirds of their classes for two semesters in a row to be dismissed from the College. Below is a sample, non-exhaustive list of indicators that may be considered by your teacher to trigger an early alert message regarding your progress:

- Student has missed at least half of the scheduled class sessions or individual conferences (3 out of 5 for classes that meet once a week).
- Student arrives more than 15 minutes late or leaves more than 15 minutes early 3 out of 5 class sessions.
- Student has earned a grade lower than C on the majority of graded assignments so far (including quizzes, homework, etc.).
- Student has turned in the majority of assignments more than 1 day late.
- If the semester ended at week 5, the student would have a grade lower than C for the class.

College-wide Tutoring

The Learning Studio, located at 618 S. Michigan Avenue, first floor, is an excellent resource for academic progress and success of all students at any level. It offers tutoring in the areas of accounting, foreign languages, mathematics, science, technology and writing, as well as peer ac-

ademic coaching. You can call 312-369-8130 to make an appointment, click the "My Appointments" tab in Oasis, or come in. For more detailed information, please visit www.colum.edu/learningstudio.

Private AA&A Tutoring & Supplemental Instruction Study Groups

Private AA&A tutoring and Supplemental Instruction (SI) Peer Study Groups are available for Audio Arts & Acoustics students currently enrolled in this course

- Tutoring takes place in the Audio Arts & Acoustics offices, 33 E. Congress, Suite 601. Schedule your tutoring appointments today through OASIS ("Make Appointments" tab; select "Audio Arts & Acoustics" and schedule a session). If you need assistance, contact Sonija Dewberry in person at the AA&A office, or at (312) 369-8820; sdewberry@colum.edu. Walk-ins appointments may be available, depending on Tutor availability.
- Please check <http://www.colum.edu/si> for SI Peer Study Group session days and times.

The goal of Private Tutoring and group SI sessions is to support student understanding of the information discussed in class. SI and Tutoring sessions are NOT a substitute for class attendance. Note that all students who take advantage of weekly Tutoring and SI sessions pass their classes, typically with a full letter grade higher than otherwise.

Studio Equipment Policies & Procedures

To manage requests for space and/or equipment utilization, the Department has developed a number of procedures applicable to both faculty and students. You can find the latest documents at <http://acousticslab.org/aaa/forms>

Adhering to these common-sense increases the likelihood that equipment and facilities will be available for the greatest number of students/faculty and over the longest possible life of the equipment. All students and faculty should be familiar with these policies and procedures.

Students with Disabilities Statement

Columbia College Chicago seeks to maintain a supportive academic environment for students with disabilities. Students who self-identify as having a disability should present their documentation to the Services for Students with Disabilities (SSD) office. After the documentation has been reviewed by the SSD office, a Columbia College accommodation letter will be provided to the student. Students are encouraged to present their Columbia accommodation letters to each instructor at the beginning of the semester so that accommodations can be arranged in a timely manner by the College, the department, or the faculty member, as appropriate. Accommodations will begin at the time the letter is presented. Students with disabilities who do not have ac-

commodation letters should visit the office of Services for Students with Disabilities, Room 304 of the 623 S. Wabash building (312-369-8296). For more see <http://students.colum.edu/ssd>

Mandatory Attendance Reporting

Per federal regulations, Columbia College Chicago is required to record by week 3 that every undergraduate student receiving federal financial aid began attendance in each class prior to disbursing funds. Attendance will therefore be taken in all CCC classrooms and absences will be reported for all students, with special potential consequences for students receiving federal financial aid. Make sure to contact your instructor in advance if special circumstances may prevent you from being able to attend part or all of the first three weeks of classes.

NOTE: This syllabus may be amended as the course proceeds. You will be notified of all changes

BASIC AUDIO SYSTEM COURSE CALENDAR

Class 1 ***Course Logistics***

Outcome 1: Students will understand and agree to the course objectives and requirements.

Outcome 2: Students will prepare for the implementation of cohorts (student locator)

Outcome 3: Students will be exposed to fundamental issues pertaining to self-assessment.

Outcome 4: Students will be review specific college-level foundation materials using a self-assessment quiz.

Outcome 4: Students will develop an understanding of the curricular matrix for the course.

Lecture: Review of specific foundation material pertaining to acoustics & electronics. An introduction to Bloom's taxonomy. An introduction to assessment concepts and to critical thinking.

Activity: Introduction to the requirements and objectives of the course. Students will plan for cohorts and will prepare for a take-home self-assessment quiz.

Assignment: None

Class 2 ***Transducers: Part I***

Outcome 1: Students will gain an appreciation for the aesthetic issues associated with the sound of specific microphones and will use the appropriate taxonomy to qualify their listening experience.

Outcome 2: Students will develop a basic understanding of the principles associated with resistance, capacitance, and inductance.

Outcome 3: Students will develop an appreciation for the relations between electric fields, magnetic fields, and electro-motive force

Lecture: Introduction to the concept of impedance. A brief introduction to Electro-Magnetic-Forces (EMF) in the context of Lenz Law and Faraday's Law

Assignment: Read the handouts and review the resources as directed by the instructor. Report on your Cohort's activities for the week. Return the curricular matrix from your Cohort.

Class 3 ***Transducers: Part II***

Outcome 1: Students will develop an understanding of the principle of operation associated with a capacitive transducer.

Class 10

Signal Processing: Part V & Loudspeakers: Part I

Outcome 1: Students will critically assess their performance on examination #2

Outcome 2: Students will get an in-depth appreciation of some of the differences between analog and digital audio signals

Outcome 3: Students will gain an understanding of the various parameters associated with the operation of electrical-mechanical transducers.

Lecture: Review of examination #2. Dynamic transducers. An introduction to speaker parameters. Taxonomy of loudspeaker components.

Activity: Students critically listen and comment on various examples of digital audio.

Assignment: Read the handouts and review the resources as directed by the instructor. Report on your Cohort's activities for the week. Students review speaker building exercise

Class 11

Loudspeakers: Part II

Outcome 1: Students will develop a critical appreciation for the concept of impedance and how it applies to electrical-mechanical transducers.

Lecture: Impedance and mechanical-to-electrical conversion with applications to loudspeakers and to other systems.

Activity: Students critically listen to the speakers from each cohort.

Assignment: Read the handouts and review the resources as directed by the instructor. Report on your Cohort's activities for the week. Cohorts present their speakers to the class for critical assessment.

Class 12

Loudspeakers: Part III

Outcome 1: Students will gain an understanding of how factors such as directivity and efficiency are influenced by the configuration of the speaker.

Outcome 2: Students will feel confident for examination #3

Lecture: Calculating directivity. An overview of non-dynamic speakers and their principles of operation.

Assignment: Read the handouts and review the resources as directed by the instructor. Report on your Cohort's activities for the week.

Class 13 ***Guest Lecture / Workshop***

Outcome 1: TBD

Lecture: TBD

Activity: TBD

Assignment: TBD.

Class 14 ***Loudspeakers: Part IV***

Outcome 1: Students will understand the various factors that place limits on the operation of a loudspeaker.

Outcome 2: Students will understand how to plot and interpret various parameters associated with the operation of a dynamic loudspeaker.

Lecture: Linear and non-linear behavior. A primer on distortion.

Activity: Students take examination #3 for the course. Students destroy a loudspeaker.

Assignment: Read the handouts and review the resources as directed by the instructor. Report on your Cohort's activities for the week.

Class 15 ***05/05/16*** ***Class Review***

Outcome 1: Students will appreciate how much material they learned during the semester

Outcome 2: Students will feel confident for the final examination

Activity: Q & A session

Assignment: Prepare questions. Report on your Cohort's activities for the week.

Class 16 ***05/12/16*** ***Final Examination***

Activity: Students take the final cumulative exam for the course.

Assignment: Prepare for the examination with your Cohort and plan for a well-deserved holiday!