

American University of Beirut

الجامعة الأمريكية في بيروت



Department of Medical Audiology Sciences

**COURSE SYLLABUS**

**Acoustics, Psychoacoustics, and Instrumentation**

**Spring 2019 / 2020**



## COURSE INFORMATION

1. Course Title: Acoustics, Psychoacoustics, and Instrumentation
2. Course Number: MAUD204
3. Credit Hours: 3
4. Prerequisite: PHYS 205 and PHYS 205L
5. Co-requisite: None
6. Prepared By: Fadi Najem, AuD, PhD, CCC-A
7. Approved By: The department academic committee

## INSTRUCTOR INFORMATION

**Name:** Fadi Najem, AuD, PhD, CCC-A  
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**Office Hours:** By appointment

## COURSE INFORMATION:

**Days / Time:** As announced by the department.  
**Place:** As announced by the department.  
**Level/Credits:** Undergraduate / 3 semester hours  
**Prerequisites:** NA  
**Moodle Site:** [MAUD 206 Moodle Site](#)

## REQUIRED TEXT(s)

The Hearing Sciences, 2<sup>nd</sup> ed (2014). Teri Hamill, Lloyd L. Price: Plural Publishing, Incorporated.  
ISBN: 1597565407, 9781597565400

Instrumentation for Audiology and Hearing Science: Theory and Practice (2012). Shlomo Silman, Michele B. Emmer: Plural Pub.  
ISBN 13: 978-1597563819, 10: 1597563811



## **COURSE DESCRIPTION AND PURPOSE**

### **Course Description and Purpose:**

The **acoustics section** provides an introduction to the physics of sound, the principles of acoustics, simple harmonic motion, sound waves, sound propagation, physical measures of sound, decibels, as well as the measures and properties of sound, noise, room acoustics, and ideal architectural acoustics.

The **psychoacoustics section** explains how the auditory system responds and reacts to different characteristics of sound, based on the acoustical properties, and the hearing physiology. This section reviews the physical, physiological, and psychological perception of sound. It provides a comprehensive understanding of psychological quantification methods of sounds and their correlation to the physical measures. Also, it explores some issues in the auditory processing of acoustic signals in normal and abnormal hearing.

The **instrumentation section** provides an introduction to electronics, amplifiers, microprocessors, transducers, output devices, wires/cables, and troubleshooting equipment problems. This section also covers calibration of audiometers and some other equipment related to audiology according to ANSI and international standards.

### **Learning Goals and Outcomes:**

Students enrolled in this course will:

1. Understand the basic concepts related to acoustics and sound.
2. Describe the different types of decibels, and understand the calculations related to the decibels.
3. Classify the different types of Noise and understand their uses.
4. Calculate impedance and energy transfer, as well as understand factors affecting sound resonance.
5. Design rooms to enhance acoustics and reduce reverberation.
  
6. Understand psychophysical measures and the methods of obtaining absolute and differential thresholds.
7. Learn the psychoacoustical measures of loudness.
8. Learn the psychoacoustical measures of pitch and frequency resolution.
9. Understand the perception of binaural Hearing including: Summation, localization, and masking effects.
10. Understand the basic concepts and safety tips related to instrumentation and calibration.
11. Identify the equipment and tools used in audiological calibration.
12. Learn the calibration procedures and standards.
13. Learn common troubleshooting skills and procedures used in audiology clinics.

### **Methods of Instruction:**

The instruction method may include, but not limited to the following:

- Lectures.
- In class demonstration.
- Homework or other assignments.



## COURSE LEARNING ASSESSMENT / EVALUATION

### Methods of Course Learning Assessment:

The following methods of learning assessment may be used for the various levels of learning in this course:

- Multiple Choice Questions (MCQs)
- True / False
- Short Answers
- Fill in the blanks
- Matching
- Assignments
- Case study
- Presentations

### Passing Grade:

Review AUB grading guideline to learn the minimum passing grade for this course. Students must complete all exams and other assignments to pass the course. Missing any exams or assignments will result in getting (INCOMPLETE) as a grade.

### Elements of Final Grades:

The following elements will determine the learner's final grade:

<b>Element</b>	<b>Weight</b>	<b>Objectives</b>
Midterm exam	40%	1-6
Homework and assignments	15%	1-5,11,12
Attendance and participation	5%	1-13
Final Exam	40%	1-13
<b>Total</b>	<b>100%</b>	



## COURSE POLICIES

**Class Attendance:** Students must attend all classes of this course (without exception). A prior approval is required for class absence except for emergencies. Students who miss more than one-fifth of the sessions of any course in the first ten weeks of the semester (five weeks in the case of the summer term) are dropped from the course, and the course withdrawal will show on the student's transcripts.

**Tardy:** Do not come late to class. Any student coming late will not be allowed to attend the class and he/she will be marked absent.

**Cell phones:** Cell phones must be silent or turned off during all the class time. If you expect an emergency call step quietly outside the classroom.

**Exams:** Failure in attending a course exam will result in **zero** mark unless the student provides an acceptable excuse to the dean who approves a re-sit exam. **It is your responsibility to attend the exam at the correct time and place.** Make sure you check the accuracy of your grades when you receive them. If there is an error in your grade, you have to notify the instructor.

**Assignments & Projects:** Assignments and projects must be submitted to the instructor on the due date. Late submission of an assignment will be graded **zero**, unless the student has an acceptable reason approved by the instructor.

**Exam Attendance/Punctuality:** Students are allowed to enter the exam room only within the first ten minutes of the exam. **However, NO extra time will be provided to this student.** If the student is more than 10 minutes late, he/she will not be allowed to attend the exam. **So, DO NOT BE LATE!**

**Re-sit Exams:** Students are not allowed to re-sit an exam unless he/she provides a written evidence as follows:

- Sickness by providing a medical report approved by the university.
- Death of a 1st degree member of his/her family.
- Accidents (e.g. car accident).
- Natural causes such as heavy storms.

**Moodle Support:** Moodle will be used in this course. Students should check the Moodle course site frequently for announcements, module guidelines, readings, resources, assessment instructions, and due dates. Should you have any difficulty with Moodle, you can consult the [Moodle for Students](#) and the [Moodle Student Guide](#). Additionally, you can contact AUB's Moodle Administrator via email ([moodle@aub.edu.lb](mailto:moodle@aub.edu.lb)) or by telephone at extensions: 3518 / 3588 / 3586.

**Recording lectures:** All course materials prepared by the instructor, together with the content of all lectures and review sessions presented by the instructor, are the property of the instructor and the university. Video and audio recording of lectures and review sessions without the consent of the instructor is prohibited. On request, the instructor will usually grant permission for students to record lectures, on the condition that these recordings are only used as a study aid by the individual making the recording. Also, unless explicit permission is obtained from the instructor, recordings of lectures and review sessions may



not be modified and must not be transferred or transmitted to any other person, whether or not that individual is enrolled in the course.

**Students with disabilities:** If you have a disability for which you may request accommodation in class please see the instructor privately with regard to this course. AUB strives to make learning experiences accessible for all. If you anticipate or experience academic barriers due to a disability (such as ADHD, learning difficulties, mental health conditions, chronic or temporary medical conditions), please do not hesitate to inform the Accessible Education Office. In order to ensure that you receive the support you need and to facilitate a smooth accommodations process, you must register with the Accessible Education Office (AEO) as soon as possible: [accessibility@aub.edu.lb](mailto:accessibility@aub.edu.lb); [+961-1-350000](tel:+961-1-350000), x3246; West Hall, 314.

**Non-Discrimination policy – Title IX – AUB:** AUB is committed to facilitating a campus free of all forms of discrimination including sex/gender-based harassment prohibited by Title IX. The University's non-discrimination policy applies to, and protects, all students, faculty, and staff. If you think you have experienced discrimination or harassment, including sexual misconduct, we encourage you to tell someone promptly. If you speak to a faculty or staff member about an issue such as harassment, sexual violence, or discrimination, the information will be kept as private as possible, however, faculty and designated staff are required to bring it to the attention of the University's Title IX Coordinator. Faculty can refer you to fully confidential resources, and you can find information and contacts at [www.aub.edu.lb/titleix](http://www.aub.edu.lb/titleix).

**To report an incident**, contact the University's Title IX Coordinator Trudi Hodges at 01-350000 ext. 2514, or [titleix@aub.edu.lb](mailto:titleix@aub.edu.lb). An anonymous report may be submitted online via EthicsPoint at [www.aub.ethicspoint.com](http://www.aub.ethicspoint.com).

**Academic Integrity:** Academic dishonesty is a serious ethical violation and WILL NOT BE TOLERATED!

The AUB student code of conduct is available on the following web page

<https://www.aub.edu.lb/sao/Documents/Student%20Handbook%202016-2017.pdf>

Education is demanding and time management is essential. Do not hesitate to use the resources around you but do not cut corners. Cheating and plagiarism will not be tolerated. Please review the Student Code of Conduct in your handbook and familiarize yourself with definitions and penalties. If you're in doubt about what constitutes plagiarism, ask your instructor because it is your responsibility to know. The American University of Beirut has a strict anti-cheating and anti-plagiarism policy. Penalties include failing marks on the assignment in question, suspension or expulsion from University and a permanent mention of the disciplinary action in the student's records.

**Definition of cheating:** Cheating is an attempt to gain marks dishonestly and includes -but not limited to- the following:

- Copying from another student's work.
- Using materials not authorized by the institute.
- Collaborating with another student during a test, without permission.
- Knowingly using, buying, selling, or stealing the contents of a test.
- Plagiarism, which means presenting another person's work or ideas as one's own, without attribution.
- Copying materials from the internet, and claiming that they are yours.



**Penalty of Cheating:**

- The minimum penalty for cheating is an **automatic Zero** for the test or assignment leading to a possible “F” for the subject. The student will be expelled from the examination room so that he/she does not disturb other students. The exam invigilator will report the case, and the report will be kept in the student file.
- A second offense will result in the immediate suspension of the student for the remainder of the current semester. A copy of the decision will be kept in the student file, while another one will be passed to the Dean.
- **Cheating is a very serious problem and it is NOT ACCEPTABLE AT ALL! Punishment for cheating will be applied promptly. So, DO NOT CHEAT! DO NOT EVEN THINK ABOUT IT!**

## COURSE SCHEDULE / CALENDAR

	Week	Lecture topic	Course objectives
<b>Acoustics</b>	1	Section (1) Review of basic concepts	1
	2	Section (2) The decibel	2
	2	Section (3) Noise	3
	3	Section (4) Impedance, Energy Transfer, Resonance	4
	4	Section (5) Room acoustics	5

<b>Psychoacoustics</b>	5	Section (1) Loudness	6
	6	Section (2) Pitch and Frequency resolution	7
	7	Section (3) Psychophysics, absolute, and differential thresholds	8
	8	Section (4) Binaural Hearing: <ul style="list-style-type: none"> <li>• Summation and Localization</li> <li>• Masking</li> </ul>	9

<b>Instrumentation</b>	9	Section (1) Review of basic concepts and safety tips	10
	9	Section (2) Equipment and tools	11
	10	Section (3) Calibration	12
	10	Section (4) Troubleshooting	13