

Last name of instructor (Semester Year)

## California State University, Sacramento

### INSTRUMENTATION IN AUDIOLOGY

CSAD613 - 3 units

Fall 2019 (AUD-1)

#### **COURSE FACULTY**

**Course Instructor:**

**Folsom Hall office #:**

**Office Phone:**

**Office Hours:**

**E-mail address:**

#### **REQUIRED CLASS MEETINGS TIMES**

Days and times:

Building: Folsom      Room #:

#### **REQUIRED TEXTS**

Moser, P.J. (2008). *Electronics and instrumentation for audiologists*. Psychology Press.

#### **OPTIONAL TEXTS**

#### **COURSE WEBSITE**

<https://sacct.csus.edu>

SacCT will be used as the learning management site for dissemination of course readings, handouts, slides, assignments, announcements, and tests/quizzes. The course faculty will have materials posted to SacCT at least 48 hours before class.

#### **Instructor Communication and Response Time**

Faculty strive to have open communication with students both within and outside of the classroom. Students are encouraged to contact faculty to discuss questions about the course. Responses to telephone or e-mail messages will usually be transmitted within 48 hours during regular working hours. If you do not have a response within this time period, please check your contact methods and resend the message. Faculty will generally respond to student questions received during evenings and weekends once they are back in the office during regular business hours.

**\*Please be aware that all content for this course is the property of the course faculty who have created it and can only be used for this course. Those wishing to use the materials outside of this course must receive written permission from the author/creator.**

#### **GENERAL COURSE INFORMATION**

##### **PRE-REQUISITES**

Admission to Doctor of Audiology program

##### **COURSE DESCRIPTION**

###### Overview

This course is designed to provide first-year Doctor of Audiology students with an understanding of instrumentation used in audiology, the principles of laws of physics, electronics concepts, and

Last name of instructor (Semester Year)

calibration of equipment. The focus of this course will be on principles of instrumentation relevant to clinical practice and the audiologic evaluation. Hands-on laboratory exercises will be provided for students to become familiar with audiologic equipment.

Approved Course Description (from CSUS Course Catalog)

Basic principles of electrical systems, calibration, signal processing, and analysis. Review of national standards related to calibration and instrumentation used in audiology.

**WHY IS THIS COURSE IMPORTANT?**

This course serves as the foundation for understanding the characteristics of measuring acoustic stimuli and calibration procedures. Students will also learn the basics of electronic devices in order to troubleshoot malfunctioning equipment in clinical practice.

**UNIVERSITY LEARNING GOALS**

	1 Disciplinary knowledge	2 Communication	3 Critical thinking/analysis	4 Information literacy	5 Professionalism	6 Intercultural/global perspectives	7 Research
Addressed by this course	X		X	X	X		X

**GRADUATE LEARNER OUTCOMES**

Mastery of each student-learning outcome listed below is indicated by a grade of B or better on each component of the corresponding measures listed in the table. Students are required to track their progress towards meeting each learning outcome and must make an appointment with the instructor for any grade equal to or less than a B. The instructor will suggest strategies to help you establish competence and knowledge in these areas.

Students should track their progress towards meeting each learning outcome by listing their grades on the table below over the course of the semester.

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

1. State basic concepts of the physics of acoustic stimuli and sounds
2. Describe the procedures for calibration of audiologic equipment
3. Perform an electroacoustic calibration of audiometers and other audiologic equipment using national and international standards
4. Apply principles of psychoacoustics to acoustic stimuli and environmental considerations for speech understanding
5. Troubleshoot malfunctioning audiometric equipment

Course Objective	Component Indicating Competence	Grade(s) Received
1,2,4	Exams (100%)	
1,2,4	Quizzes (100%)	
1-5	Class participation (100%)	
3	Calibration activities (100%)	
4	Sound level meter lab (100%)	

**COURSE/CLASS POLICIES**

Last name of instructor (Semester Year)

## **Course Format**

Lecture

### **Class Preparation:**

All required readings are for the date listed in the course schedule, not the following class period. Students are responsible for all assigned readings, whether discussed in class or not.

### **Class Participation:**

Students are expected to actively participate in class discussions and are required to have read the assigned material prior to class meetings.

### **Class Attendance:**

Classroom attendance is necessary for this course. No more than three unexcused absences are allowed. Students are expected to arrive on time as class begins at X:XX am/pm.

### **Class Assignments**

Course grades will be based on ten quizzes, calibration activities, a lab, and two exams.

### **Quizzes**

Weekly quizzes will be available on SacCT one week prior to the due date. Students are expected to complete the quiz before the scheduled due date. Quizzes are based on assigned reading. Students will have 60 minutes to take the quiz; late submissions will receive a 0.

### **Sound Level Meter Lab**

Students will work in pairs to measure sound levels with different filters on the sound level meter.

### **Calibration Activities**

Students will perform calibration of various instruments and equipment in the clinic and labs.

### **Exams**

- **Exam absences:** No make-up examinations will be given unless there is a documented emergency for which you have written proof. Any approved make-up exams will be scheduled at the end of the semester (during finals week) and may be administered in a different format from the original exam.
- **Exam procedures:**

Test arrival/start

Test duration and completion

### **Commitment to Integrity**

As a student in this course (and at this university) you are expected to maintain high degrees of professionalism, commitment to active learning and participation in this class and also integrity in your behavior in and out of the classroom.

### **Sac State's Academic Honesty Policy & Procedures**

"The principles of truth and honesty are recognized as fundamental to a community of scholars and teachers. California State University, Sacramento expects that both faculty and students will honor these principles, and in so doing, will protect the integrity of academic work and student grades." Read more about Sac State's Academic Honesty Policy & Procedures at the following website: <http://www.csus.edu/umannual/AcademicHonestyPolicyandProcedures.htm>

Last name of instructor (Semester Year)

**Definitions:** At Sac State, “cheating is the act of obtaining or attempting to obtain credit for academic work through the use of any dishonest, deceptive, or fraudulent means.”

“Plagiarism is a form of cheating. At Sac State, “plagiarism is the use of distinctive ideas or works belonging to another person without providing adequate acknowledgement of that person’s contribution.” *Source:* Sacramento State University Library

*Note:* Any form of academic dishonesty, including cheating and plagiarism, shall be reported to the office of student affairs.

### **Understand When You May Drop This Course**

It is the student’s responsibility to understand when he/she need to consider disenrolling from a course. Refer to the Sac State Course Schedule for dates and deadlines for registration. After this period, a serious and compelling reason is required to drop from the course. Serious and compelling reasons include: (a) documented and significant change in work hours, leaving student unable to attend class, or (b) documented and severe physical/mental illness/injury to the student or student’s family. Under emergency/special circumstances, students may petition for an incomplete grade. An incomplete will only be assigned if there is a compelling extenuating circumstance. All incomplete course assignments must be completed in accordance with the department’s policy.

### **Accommodations**

Inform your instructor of any accommodations needed. If you have a documented disability and verification from the Office of Services to Students with Disabilities (SSWD), and wish to discuss academic accommodations, please contact your instructor as soon as possible. It is the student’s responsibility to provide documentation of disability to SSWD and meet with a SSWD counselor to request special accommodation before classes start. SSWD is located in Lassen Hall 1008 and can be contacted by phone at [\(916\) 278-6955](tel:9162786955) (Voice) or [\(916\) 278-7239](tel:9162787239) (TDD only) or via email at [sswd@csus.edu](mailto:sswd@csus.edu)

### **Course Requirement Grading**

<b><u>Activity</u></b>	<b><u>Points Available</u></b>
Quizzes (10 points x 10)	100
Sound level meter lab	50
Calibration activities (25 points x 2)	50
Midterm exam (date and material covered)	300
Final exam (date and material covered)	300
<b><u>TOTAL COURSE POINTS AVAILABLE</u></b>	800

### **Overall Percentage Needed**

Note: A grade of “B” or higher is required to count toward the minimum number of units needed to advance to candidacy.

<b><u>Grade</u></b>	<b><u>Percentage</u></b>
A	93-100%
A-	90-92%
B+	87-89%
B	83-86%
B-	80-82%

Last name of instructor (Semester Year)

C+	77-79%
C	73-76%
C-	70-72%
D+	67-69%
D	63-66%
D-	60-62%
F	< 60%

**COURSE SCHEDULE OF LECTURE TOPICS AND EXAMS**

Date	Topic and Activity or Quiz and Exam	Readings/ Assignment
8/26	Introduction to class; overview of audiology clinic equipment	
8/28	Structure of sound booths	Margolis, R.H., & Madsen, B. (2015). Tutorial—The acoustic test environment for hearing testing. <i>Journal of the American Academy of Audiology</i> , 26, 1-8.  <a href="http://www.iacacoustics.com/pdf/medical/AC_120a_DataSheet_FINAL_WEB.pdf">http://www.iacacoustics.com/pdf/medical/AC_120a_DataSheet_FINAL_WEB.pdf</a>
9/2	Sound field testing and configurations Quiz 1	Otometrics (n.d.). Audiometric sound rooms. Retrieved from <a href="http://www.otometrics.com/media/DownloadLibrary/PDFs/Otometrics/PDFs/Knowledge%20center%20sp-content/FGE%20NIE%20sp-Sound%20sp-Rooms/F7-26-1911-EN_00_STD.ashx&amp;sg=AOvVaw3enn5VARgF_m4J5kCEHJgG">www.otometrics.com/media/DownloadLibrary/PDFs/Otometrics/PDFs/Knowledge%20center%20sp-content/FGE%20NIE%20sp-Sound%20sp-Rooms/F7-26-1911-EN_00_STD.ashx&amp;sg=AOvVaw3enn5VARgF_m4J5kCEHJgG</a>
9/4	Sound field setup	Cornelisse, L.E., & Moroso, M.J. (1990). Test conditions, stimuli, and calibration values for sound field testing.

DRAFT

Last name of instructor (Semester Year)

		<i>Journal of Speech-Language Pathology and Audiology, 14(1), 21-28.</i>
9/9	Introduction to hearing aid and audiologic instrumentation	
9/11	Principles of electricity and circuitry Quiz 2	Moser- Ch. 1
9/16	Circuitry	Moser- Ch. 2-3
9/18	Analog and digital signal processing Quiz 3	Moser- Ch. 11-12
9/23	Digital filters Quiz 4	Moser- Ch. 8
9/25	Frequency response Amplifiers	Moser- Ch. 8-10
9/30	Transducers and specifications Quiz 5	Moser- Ch. 14
10/2	Wires, cables, and cords	
10/7	Wireless technology Quiz 6	
10/9	Review for midterm exam	
10/14	<b>Midterm exam</b>	
10/16	Sound level meters and filters	Malchaire, J. Sound measuring instruments. who.int
10/21	Sound level meter lab	
10/23	Noise levels	Neitzel, R. (2008). NIOSH and OSHA permissible noise exposure limits. Retrieved from <a href="https://www.audiologyonline.com/ask-the-experts/niosh-and-osh-permissible-noise-247">https://www.audiologyonline.com/ask-the-experts/niosh-and-osh-permissible-noise-247</a>
10/28	Biologic calibration Quiz 7	NHANES. (2003). Audiometry procedures manual. cdc.gov
10/30	Calibration standards: immittance	Rosowski, J.J., & Wilson, L.A. (2015). Acoustic immittance, absorbance, and reflectance in the human ear canal. <i>Seminars in Hearing, 36(1), 11-28.</i>
11/4	Calibration standards: Bone conduction	Margolis, R.H., & Stiepan, S.M. (2012). Acoustic method for calibration of audiometric bone

Last name of instructor (Semester Year)

		vibrators. <i>Journal of the Acoustical Society of America</i> , 131(2), 1221-1225.
11/6	Calibration standards: Air conduction and speech audiometry	Moser- Ch. 16 Champlin, C.A., & Letowski, T. (2014). Audiometric calibration: Air conduction. <i>Seminars in Hearing</i> .
11/11	Calibration standards: Sound field	Beynon, G., & Munro, K. (1993). A discussion of current sound field calibration procedures. <i>British Journal of Audiology</i> , 27(6), 427-435.
11/13	Room acoustics Quiz 8	
11/18	Room acoustics and speech perception	Yang, W., & Bradley, J.S. (2009). Effects of room acoustics on the intelligibility of speech in classrooms for young children. <i>Journal of the Acoustical Society of America</i> , 125(2), 922-933.
11/20	Effects of reverberation and background noise on speech perception Quiz 9	Halling, D.C., & Humes, L.E. (2000). Factors affecting the recognition of reverberant speech by elderly listeners. <i>Journal of Speech, Language, and Hearing Research</i> , 43(2), 414-431.
11/27	Environmental modifications	Dyre, L. (2016). Educational solutions for children with listening challenges. Retrieved from <a href="https://www.audiologyonline.com/articles/classroom-solutions-and-modifications-for-17364">https://www.audiologyonline.com/articles/classroom-solutions-and-modifications-for-17364</a>
12/2	Hearing aid couplers Electroacoustic analysis	Brown, M. (2008). Evaluating the

DRAFT

Last name of instructor (Semester Year)

	Quiz 10	performance of digital hearing aid features: A real-world approach. Retrieved from <a href="https://www.audiologyonline.com/articles/evaluating-performance-digital-hearing-aid-916">https://www.audiologyonline.com/articles/evaluating-performance-digital-hearing-aid-916</a>
12/4	Review for final exam	
12/12	<b>Final exam</b>	

Please note that dates, topics, and assignments are subject to change. In the event of a change, you will be given ample notification of the change.

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