

INSTRUCTOR:

Dr. Lily Wang
101A PKI Building, 554-2065, LWang4@UNL.edu
Office hours: Thursdays 3:00 to 5:00 PM and by appointment

TEACHING ASSISTANTS:

Lauren Ronsse (Assistant Lecturer)
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Cassandra Wiese (Teaching Assistant/Grader)
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LECTURES:

MWF 10:30-11:20 AM, 359 PKI Building
Two additional labs will be scheduled.

PREREQUISITES:

PHYS 2120, General Physics – Calculus Level (or equivalent)
MATH 3350, Differential Equations (or equivalent)
Admission to 3rd Year AE Courses

REQUIRED TEXTBOOK:

Architectural Acoustics: Principles and Design – Mehta, Johnson, and Rocafort (Prentice-Hall, 1999)

COURSE WEBPAGE:

Login from <http://myuno.unomaha.edu/> using your Lotus Notes username and password.

PROGRAM OUTCOMES:

The University of Nebraska architectural engineering faculty and advisory committee expect graduates will have demonstrated the following knowledge, abilities and attitudes:

- a) An ability to apply **knowledge of mathematics, science, and engineering**
- b) An ability to **design and conduct experiments**, as well as to **analyze and interpret data**
- c) An ability to **design a system, component, or process** to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d) An ability to function on **multi-disciplinary teams**
- e) An ability to **identify, formulate, and solve engineering problems**
- f) An understanding of **professional and ethical responsibility**
- g) An ability to **communicate effectively**
- h) The **broad education** necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i) A recognition of the need for, and an ability to engage in **life-long learning**
- j) A knowledge of **contemporary issues**
- k) An ability to **use the techniques, skills, and modern engineering tools** necessary for engineering practice.

Building Acoustics Fundamentals – Syllabus

COURSE OBJECTIVES:

This course will focus on the following knowledge, abilities, and attitudes:

- a. Reinforce the previously learned math, science, and engineering fundamentals and then apply this knowledge to the area of acoustics in buildings
- c. Design building acoustic systems, and understand how these systems are integrated into total building
- e. Identify and solve problems involving building acoustics
- j. Understand and appreciate current contemporary issues related to acoustics
- k. Learn techniques, skills, and engineering tools associated with building acoustics practice
- b. Conduct experiments, and analyze/interpret data concerning the acoustics of buildings
- d. Work as part of a team on laboratory projects for this class
- g. Practice ability to communicate effectively, particularly through writing laboratory reports

TENTATIVE LECTURE TOPICS:

- I. Fundamentals of acoustics
 - a. Terminology: speed of sound, frequency, wavelength, sound levels
 - b. Wave equation in fluids
- II. Human hearing and basic psychoacoustics
- III. Sound propagation
 - a. In free field
 - b. Boundary interaction
- IV. Basic room acoustics
 - a. Modal theory
 - b. Reverberation time
 - c. Material properties
 - d. Measurement techniques
- V. Noise control in buildings
 - a. Noise criteria
 - b. Air-borne sound insulation
 - c. Structure-borne sound insulation (impact noise, vibration isolation)
 - d. HVAC noise control

GRADING POLICIES:

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

Homework	20%
2 Lab Reports (7.5% each)	15%
Quizzes	10%
Midterm Exam I	15%
Midterm Exam II	15%
Final Exam	25%
Total	100%

You may view your grades for this course at any time on the course webpage!

Building Acoustics Fundamentals – Syllabus

Final letter grades are assigned based on the system shown below:

98-100	A+
94-97	A
91-93	A-
88-90	B+
84-87	B
81-83	B-
78-80	C+
74-77	C
71-73	C-
68-70	D+
64-67	D
61-63	D-
0-60	F

HOMEWORK

- Homework assignments will be handed out in class, as well as posted on the web page.
- Homework must be turned in at the **beginning of class** on the due date.
- Late homework received before the end of class on the due date is penalized 10%.
- Late homework received between the end of class on the due date and the beginning of the next scheduled class is penalized 20%. After that, late homework will not be accepted, and the student will receive 0 on that assignment.
- Solutions to the homework will be provided on the web page.

LAB REPORTS

- Laboratory experiments will be run in groups, assigned by the instructor; however, lab reports are to be written individually.
- Lab reports must be turned in at the **beginning of class** on the due date. **No late lab reports will be accepted.**
- Details on the lab experiments and report format will be provided at a later date.

POLICY ON ACADEMIC DISHONESTY:

Academic dishonesty, such as in the form of cheating or plagiarism, is not acceptable and will be dealt with according to the rules and regulations set forth in the UNO Student Handbook. Please feel free to study and discuss class concepts with your other classmates, but **do not claim someone else's work as your own, including using another person's calculations, spreadsheets, computer programs, homework solutions, or ideas.** Any incident of academic dishonesty associated with this course will result in the student receiving an automatic grade of 'F' for the course. Please read Section II of the UNO Student Code of Conduct for additional details.

Week	Date	General Topic	Reading	HW	Labs	Exams	
I	8/25	Introduction					
	8/27	Fundamentals of acoustics	Ch. 1 1.1 – 1.3	#1			
	8/29						
II	9/1	<i>Labor Day Holiday</i>					
	9/3	Wave equation					
	9/5						
III	9/8	Speed of sound		#1 due			
				#2			
	9/10	Sound levels	1.4 – 1.5, App. B				
	9/12						
IV	9/15						
	9/17	Human hearing and basic psychoacoustics	Ch. 2 2.1 – 2.5	#2 due			
				#3			
	9/19						
V	9/22						
	9/24	Sound propagation – free field	1.6 – 1.7	#3 due			
	9/26	<i>Review</i>					
VI	9/29	Midterm Exam I					Midterm I
	10/1	Sound propagation – boundary interaction	Ch. 3 3.1 – 3.10	#4			
	10/3						
VII	10/6	Room acoustics	App. C				
	10/8		Ch. 10 10.1 – 10.8				
	10/10			#4 due			
				#5			
VIII	10/13	Reverberation time	App. G		Lab I		

Building Acoustics Fundamentals – Course Calendar

	10/15					
	10/17					
IX	10/20	<i>Fall Break – no class</i>				
	10/22	Sound absorbing materials	Ch. 4 4.1 – 4.11	#5 due		
	10/24					
X	10/27					
	10/29	<i>Review</i>			Lab I due	
	10/31	Midterm Exam II				Midterm II
XI	11/3	Noise control (LR)	Ch. 8 8.1 – 8.5	#6		
	11/5					
	11/7	Airborne sound insulation	Ch. 5 5.1 – 5.13			
XII	11/10	(GI)	App. F			
	11/12	(GI)	Ch. 6 6.1 – 6.8	#6 due	Lab II	
	11/14					
XIII	11/17	Structure-borne sound insulation (LR)	Ch. 7 7.1 – 7.6			
	11/19					
	11/21					
XIV	11/24	Vibration isolation	Ch. 15 15.1 – 15.5			
		<i>Thanksgiving Holiday 11/26 – 11/30</i>				
XV	12/1	(LR)		#7	Lab II due	
	12/3					
	12/5	HVAC systems	Ch. 9 9.1 – 9.7			
XVI	12/8	<i>Dead Week</i>		#7 due		
	12/10					
	12/12	<i>Review</i>				
Wed.	12/17	Final Exam (10:30 AM – 12:30 PM)				Final