EEE 4720 –Acoustics – Spring 2018

Instructor: Dr. Mark Sheplak, Room 215 Larsen Hall, 2-3983, sheplak@ufl.edu,
Lecture Times: MWF 7th period (1:55 – 2:45 pm) in Benton 328.
Office Hours: T / Th (1:00 – 2:00 pm), other times by appointment.

Required Textbook: Fundamentals of Physical Acoustics, by David T. Blackstock, Wiley-Interscience, New York, 2000.

Optional Textbooks: Electroacoustics, Kleiner, M., CRC Press, N.Y., N.Y., 2013.
Acoustics: Sound Fields and Transducers, Beranek, L.L. and Mellow, T.J., Academic Press, N.Y., N.Y., 2012.

Teaching Assistant: n/a

Prerequisites: EEL 3111C / EEL 3003 (Circuits 1 or equivalent) and MAP 2302 (Elementary Differential Equations or equivalent) or permission of the instructor.

Course Objectives: You will develop a working understanding of the basic theory of physical acoustics including wave theory for sound generation/radiation, and propagation.

Course Content:

- Governing equations for wave theory of sound
- Character of plane acoustic waves and 3-D acoustic fields
- Sound transmission/reflection at an interface between two media
- Waves transmission/attenuation in ducts
- Low frequency approximations (lumped-element modeling) and transducers
- Sources of sound

Reading Assignments: Reading assignments will be made periodically. If I feel that the bulk of the class is not keeping up with the reading assignments, I reserve the right to give unannounced quizzes.

Student Expectations: It is expected that this course will require at least 15 hours of effort per week when you consider time spent for lectures, reading assignments, homework, and re-writing of your class notes. I also expect that you will attend every lecture If you cannot attend a lecture, please notify me prior to class (unless in the case of an unanticipated emergency). I strongly recommend that you implement the "Five Times Strategy" for learning in this class. This requires that you cover the course material at least 5 times before exams. The first time that you cover the material is when you perform your reading assignment before class. The second time that you cover the material is during lecture. The third time that you cover the material is when you re-write your "lecture set" of notes that includes material from lecture and the reading assignments, including all derivations and your additions. The fourth time that you cover the material is when you do your homework assignments. Finally, the fifth time that you cover the material is when you study for your exams. This technique will help you master the material and also will provide you with a comprehensive set of notes to potentially teach from one day.

As part of a pilot program at UF, this course has been chosen to require each student to complete online course evaluation in order to pass the course. Specifically, each student must log into the system https://evaluations.ufl.edu and either fill out an evaluation or opt out (this requires logging in). While students can log in and opt out, the department much prefers the valuable feedback from each of you. It should not take more than five minutes for completion. If you have any questions about this policy, please contact ECE Department Chair Dr. John Harris at harris@ece.ufl.edu.

Homework: Homework will be assigned periodically. They will be collected via Canvas. I will post solutions on Canvas for you to review.

Student Behavior: You are expected to show up on time for class. Please turn off all cell phones prior to the start of class. Please do not bring food to class.

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Late/Makeup Policy: No late homework assignments will be accepted. Makeup exams are not allowed. If you cannot attend an exam or cannot meet a due date, you must contact the instructor **prior** to the exam or due date.

Accommodations: Students with disabilities who are requesting classroom accommodation must first register with the Dean of Students Office. They will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodations. I am not permitted to make these decisions. See http://www.dso.ufl.edu/drc/ for more information.

Academic Honesty: All students **MUST** review the University's "Student Honor Code" (https://sccr.dso.ufl.edu/students/student-conduct-code/)

Exams: There will be three exams listed below. They will be given at night with time and location TBD. There will be no final exam. **There will be no alternative times for the exams**.

Grading:

Exam 1 (2/12/18)	30 %
Exam 2 (3/19/18)	30 %
Exam 3 (4/25/18)	30 %
HWs, quizzes, etc.	10 %
Total	100 %

Course Notes:

The course will be taught from the board and then reviewed from a computer using my typeset "summary" notes. These notes are meant to accompany the assigned readings from the text and reference books. **They are not to be considered substitutes.** You will be responsible for both the material covered in class and the assigned readings.

Policies/Procedures for Homework:

1. Homework is an essential element of this course as it will help you to learn the material via application.
2. Solutions to the homework will be available on the class website after class on the date the assignment is due. It will be submitted via Canvas.
3. Performance on the homework will count the student's final grade directly and exam material may be taken directly from HWs. Consequently, individual work must be expected on all problems to ensure a proper grasp of the material. Students are encouraged to discuss the general principles involved in the homework sets with one another, but the solution of each problem must be attempted individually.
4. Here is a suggested format for HWs that will help you organized your thoughts.

Format:

1. Use 8.5" x 11" paper and write on one side. State each problem on a new page.
2. Each homework problem must be completed in a standard format, which includes the following labeled steps:
   - *GIVEN:* After carefully reading the problem, state briefly and concisely what is known. Do not repeat the problem statement.
   - *FIND*: State briefly and concisely what must be found.
   - *SCEMATIC:* Draw a schematic of the physical problem to be considered. Note the control volumes used in the analysis by dashed lines on the sketch. Include coordinate axes when appropriate, and label relevant dimensions and velocities.
   - *BASIC EQUATIONS:* Provide the appropriate assumptions and mathematical formulation for the basic laws that you consider necessary to solve the problem.
   - *SOLUTION:* Provide full details of the analysis in a logical manner. Develop the analysis as far as possible before substituting numerical values. Give the answer algebraically before computing the final numerical result (if required). Clearly indicate your final answer.
3. Attach a listing of any computer program(s) used in the solution.