

OCCUPATIONAL NOISE CONTROL (3 Credits)

EH 656

Fall 2006

Tuesday & Thursday 8:00-9:15 am

111 MRBSC or as arranged

Instructors

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Course Objectives

After successfully completing this course, the student will be able to:

- Identify and describe the structures and function of the human ear;
- Describe the impact that hazardous noise can have on the human ear and hearing (EO 6.2.2);
- Describe the physical nature of noise, manipulate the relationships between power, intensity, and pressure and relate them to damage risk potential (hearing loss or other risk) for exposure to noise in the occupational environment;
- Anticipate, recognize, evaluate, and control occupational and environmental noise (EO 6.2.1, 6.2.4, & 6.2.14).
- Implement common field noise-assessment techniques to evaluate hazardous noise using industrial hygiene monitoring equipment (EO 6.2.3);
- Interpret noise field monitoring results;
- Describe and apply the principles of noise reduction at sources, receivers, and in the path between sources-receivers in a variety of exposure situations;
- Interpret and explain applicable workplace and environmental noise standards (EO 6.2.7 & 6.2.8);
- Demonstrate teamwork and communicate the evaluation and control of hazardous noise in a professional manner (verbally and written) while completing a capstone team project (EO 6.2.10 and 6.2.13); and
- Solve a complex hazardous noise problem through observation, measurement, and data analysis using the basic scientific method (EO 6.2.5).

Note: EO refers to the Occupational and Environmental Health Section Educational Objectives.

In meeting these objectives, the student will be expected to complete a capstone team project culminating in a technical design "fix" for an actual field noise project by applying the principles and techniques learned in this class. This project will be presented in a written and an oral report. Further, the teams will be expected to explain

and interpret this capstone technical design to the client company or agency involved and defend it to peer professionals in the field.

Grading

This course is graded on a straight percentage basis with the following weight given to each grading category:

- Examination: 30%
- Homework exercises: 30%
- Final written project report: 25%
- Final oral project report: 15%

Grades will be assigned according to the following schedule (numbers given as percentages):

- A 90-100
- B 80-89
- C 70-79
- D 60-69
- F <60

In addition, the following requirements shall be strictly adhered to:

- Percentages will be computed to two decimal places and rounded to the nearest whole number (e.g. 89.50 rounds to 89; 89.51 rounds to 90).
- Assignment due dates are at the start of class on the scheduled date.
- Late assignments will not be accepted or scored except for prior arrangements or in the case of extraordinary circumstances beyond the control of the student.
- All class members are expected to be present and participate in all scheduled class room or field sessions.
- Absences should be arranged in advance and team members and the instructors shall be notified.
- Absences due to "last minute vagaries of life" (which preclude advance notification) should be acknowledged to the instructors as soon as possible after occurrence.

Textbooks

- AIHA "The Noise Manual" 2000 (5th edition)
- Royster and Royster "The Noise -Vibration Problem-Solution Workbook" 2002 (1st edition) (Optional)

Reference book

- L. H. Bell "Industrial Noise Control" Marcel Dekker Co. (current edition)
This reference book is available at Morgan Library.

Student Presentation of Noise Standards

Students will present the module of *Noise Standards* to the course instructor. They will be coached during their presentation and evaluated on their presentation style to prepare

them for the presentation of the final project. An evaluation sheet of student performance will be submitted to the ABET coordinator as a measure of student performance.

Team and Final Project Assignments

Teams will work together on all homework assignments and the final project. Team members will share responsibilities, talents, expertise, and resources to meet the demands of the class. Individual homework assignments are required even though the students work on the assignments as a team. However, for the final project, ONLY one report will be prepared for the team. In addition, the team will jointly participate in a formal oral presentation describing the project.

Course Evaluation

A formal course evaluation form will be distributed in your mailbox prior to the final class meeting. The course evaluation will be collected at the scheduled final examination period for on-campus students. You may complete it with a signature or anonymously and the mechanism for submission will shield your identify during the final examination period.

Please be as forthright and detailed with comments on the evaluation forms as you feel that you can be. These comments and observations will shape the content and format of this class for future students.

TEAM ASSIGNMENTS GUIDANCE

Overview

During the course of this semester, your job is to learn how to:

- Measure,
- Characterize,
- Assess the impact of, and
- Control noise exposures in industrial and environmental situations.

To this end, you will need to be able to design noise measurement methods, execute field projects and report on those projects to persons who may not have your technical expertise but need to approve your ideas for implementation or control purposes. As a result, each homework assignment of this course with the exception of the first assignment (ACOUSTICS HOMEWORK) will be undertaken as though it were a field project within your professional area of responsibility.

Homework Reports

Each report will be addressed to the course instructors as “Directors of Facilities and Technical Services.” Each homework report will contain:

- An executive summary no more than two pages summarizing the problem, your major findings and your recommendations (25%);
- A clear independent statement of the problem (15%);
- Your approach/methodology for assessing the problem (25%);
- A presentation of your summary data to illustrate your findings and a discussion of your results and presentation of your recommendations with alternatives (35%), as appropriate.

All reports will be saved electronically so that a portfolio of your work may be reproduced at the end of the semester. Each individual report will be submitted as an email attachment to the instructor noted no later than the date given in the course schedule. Team members are encouraged to consult and work together to gather data, compare notes and solve problems. It is appropriate for separate teams to consult or brainstorm to solve problems as well. This is not intended to be individual competition for grades, rather, it is a simulation of the problems that you will face in the future.

The individuality of each person will be mirrored in the way that the report or assignment is prepared and presented. The data should be the same for all team members as you are addressing the same issue. For each assignment, it is suggested that one team member be chosen by the team serve as the coordinator of work and effort.

Homework Reports Corrections

On each graded homework assignment EXCEPT for assignment number 1, the student may address deficiencies noted by the instructor and resubmit the assignment for re-evaluation and consideration of additional credit. The due date for such submission will be by class time ONE WEEK (weekends and holidays excepted) following the original submission. The maximum amount of additional points that can be earned would be 50% of the difference between the original score and a perfect score of 100% (example: original score of 70% and **all** deficiencies corrected on re-submission so NEW final score would be 85%).

Final Project Report

The final project for this class will be assigned early in the semester and each project will be presented to the class in a formal, oral presentation during finals week. The team will select a leader for this project who will be responsible for coordinating work and submitting the ONE written report for the final project via email to the course instructor. Each team member will participate in the final oral presentation. The use of audiovisual aids of any type to illustrate your problem, your approach, your data and interpretation, and your recommendations are highly encouraged. Your initial written reports on this project will be due as per the schedule. The final project is delivered as a final written report to client locations that allowed the assessments to be conducted at their facilities.

The final written report is not complete until a version of this final project is signed by all team members and the course instructors attesting to the achievement of the project objectives in a reasonable and accurate manner. The comments made by the instructors or peers at the submission of the initial written report or during the formal verbal presentation will be incorporated into the final project report as part of the peer review process. A final date for completion of project report to be released to the client location will be set early in the semester. Failure to complete the final project report by that time will result in a 10% reduction of your final point total for the class.

Class Schedule and Assignment Due Dates (Fall 2006)

Mo	Day	Topic	Reading	Instructor
8	22	Class Orientation Ear Physiology & Hearing Loss	Chs. 1 & 4	Brazile
8	24	Audiometry and Hearing Response	Chs. 5 & 11	Brazile
8	29 31	Acoustics Theory & Sound Propagation	Ch. 2	Sandfort
9	5			
9	5 7	Noise Measurement: Basics	Ch. 3	Brazile
9	12 14	Noise Measurement: Ultrasound and Vibration	pp 36-38, 143, 305-324, 425-426	Brazile
9	19	Noise Measurement: Interpretation	Ch. 7	Brazile
9	21	Noise Standards—Students Present Lecture	Ch. 16	Students
9	26 28	Environmental Noise Measurement Environmental Noise: Community and State Laws	Ch. 15	Brazile
10	3	Examination 1	This is a closed-book test, however, you may bring an equation sheet	Brazile
10	5	Noise Administrative and PPE Controls	Ch. 9 pp 369-374 Ch. 10	Sandfort
10	10	Enclosures	Ch. 9 pp 350-362	Sandfort
10	12	Absorptive Materials	Ch. 9 pp 338-350	Sandfort
10	17	Barriers	Ch. 9 pp 350-362	Sandfort
10	19 24	Room Treatment	Ch. 9 pp 31-36, 338-348	Brazile
10	26	Silencers	Ch. 9 pp 325-330 & Ch. 8 from Bell	Brazile
10	31	Gear and Fan Controls	Ch. 11 & 13 from Bell	Brazile
11	2	Valve and Gas Jet Noise	Ch. 9 pp 330-333 & Ch. 13 from Bell	Brazile
11	7	Final Class Meeting (open for special topics or covering additional material not covered)	None	Brazile

		previously)		
11	9	Release to end of term for projects; Consult instructors as necessary.	None	Brazile & Sandfort
11	20-24	Fall Recess—No classes		
12	13	Final presentations of projects. Date and time to be announced according to the University schedule.	None	Brazile & Sandfort

Assignment Due Date (Month/Day)	Assignment
8/31	Hearing Conservation
9/7	Acoustics Homework (Submit hard copy or e-mail attachment to Del Sandfort)
10/5	Environmental Assessment
10/12	Hearing Protection
10/31	Room Treatment
12/7	Final Written Projects Due, 5:00 p.m.
12/11	Week of finals; oral presentations will be made by each group during scheduled final period. In-class evaluations will be submitted at this time.
TBD	Date for final completion of written final project; approved by all group members and the instructors and in a format ready for delivery to the client site.