Breathe Better Bus Project
Syllabus
Spring 2001

Instructors

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In general, you can stop by for help anytime. I may be in the middle of something, and may not be able to help you right away. You can always make an appointment to meet at another time. Also, I read my e-mail two or three times a day, and can give quick response to short questions that way.

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Course Website

http://stripe.colorado.edu/~shellym/MCEN/BBB

Course Goal

The goal of the Breathe Better Bus Project is to design and build a Breathe Better Bus with interactive stations on board for children. This project is sponsored by the nonprofit Breathe Better Foundation, which is concerned with educating and providing community services related to asthma. The bus will enable lung health specialists to reach numerous children as schools and provide educational messages for prevention and management of lung disease in a setting that is exciting and fun to learn. The project tasks are the design and construction of six learning stations and their installation in a dedicated bus.

A recently purchased, used RTD bus will be remodeled for this project. The bus is fueled with compress natural gas and is wheelchair accessible. Preparation of the bus will take place near the engineering center spring 2001 semester and includes removal of the transit seats, installation of a generator, installation of an air compressor, and construction of bulkheads. The vehicle will be wired for power and communications, and the interior finished appropriately. The exterior of the bus will be painted with artwork consistent with its mission.

Six prototype learning stations were designed and built during the fall 2000 semester by Prof. Melinda Piket-May's GEEN 1400 class. The stations were well received at the recent design expo. The learning stations illustrate and teach issues related to allergies and asthma including learning about

the anatomy and function of a normal lung, effects of asthma, hazards of smoking, and healthy outdoor air. Each learning station is designed to fit into a standardized bay 30 x 36 in (7.5 sq. ft), thus allowing easy replacements and arranging. A learning station bay will be approximately one and a half meters wide, three-quarters of a meter deep and up to two meters tall, and supplied with 110 VAC, 12 VDC, LAN and compressed air.

Course Format

The spring semester of 2001 will be used to redesign and rebuild the learning stations, focusing on durability, reliability, and teaching potential, and remodeling the bus. These tasks will be accomplished within the context of this Special Topics course MCEN 4228, offered by Prof. Miller and co-taught with Mr. Robert Wootten. Mr. Robert Wootten is a project engineer at Ball Aerospace and a graduate student in the Engineering Management program at CU. 3-4 students will be dedicated to the remodeling of the bus, procuring components and installing the learning station bays. 12-13 students will be tasked with the learning station overhaul. We will use the Gill studio in the ITLL for working on the learning stations. The 165 sq. ft. of space within the studio would be used for working on each learning station and is ample room for the 6 stations (7.5 sq. ft/station = 45 sq. ft.). In addition to the ME students, we are working with an art student, Tom Varani, who is designing and painting the bus exterior.

The class will meet formally once a week for 1.5 hours. The class meeting will be spent on the following two areas. The first 45 min – 1 hour will be learning time in which formal design will be discussed and taught by Mr. Wootten. The final 30 – 45 min will be project time in which each student will give progress reports and project details will be discussed with Prof. Miller.

Course Outline

1. UNDERSTAND AND DOCUMENT THE DESIGN PROBLEM (WEEKS 1–4)
    - What is “Design”?
    - Learning Station Evaluation
    - Design Specifications (envelope, interfaces, standards)

    Progress Report Due Feb 12
2. SOLVING THE DESIGN PROBLEM (WEEKS 5– 7)
    - Concept Designs/Trade Studies
    - Design Layouts
    - Detailed Designs

    Progress Report Due Mar 5
3. CARRYING OUT THE DESIGN (WEEKS 8– 13)
    - Materials/Manufacturing
    - Budgeting
    - Assembly

    Progress Report Due Apr 16
4. REALITY CHECK (WEEKS 14– 16)
    - Field Testing
    - Project Closure

Final Report Due May 7

Assignments

The purpose of the assignments is for you to (1) learn more about the important information involved in the breathe better bus including respiratory health and air pollution, (2) practice solving problems that arise in engineering design, and (3) learn how to communicate your results to others. 5 – 7 assignments will be issued. The assignments will be posted on the course website for you to access. For most assignments students should form a team consisting of 2 people and each team only needs to submit one copy of the assignment solutions. The format of the submitted solutions should be typed, 1–2 pages double spaced, 12pt Times New Roman, 1inch margins. Always restate the objective of the assignment and discuss briefly the significance of the results.

Written Reports and Oral Presentations

Each student team will be responsible for writing a final report and giving an oral presentation on the work they conducted during the semester. Three progress reports (1–2 pages double spaced, 12pt Times New Roman, 1inch margins), describing your work will be submitted. They are due on Feb 12, Mar 5, and Apr 16. Final reports are due May 7, will be no more than 15 pages (double spaced, 12pt Times New Roman, 1inch margins), and will follow the format of the peer-reviewed journal *Aerosol Science and Technology*. Oral presentations will be for 15 minutes and scheduled during the final exam time.

Administrative Details

You *will be responsible for all material given in class*. Thus, if you are going to miss class, plan on getting the notes and assignment information from a friend. It is expected that you will spend 6 – 10 hours per week on this class including class time. Mostly you will work on your own time. You are expected to be responsible and organized. You should be managing your time as if you were working on this project as an engineer at a local engineering design firm.

Grades will be based on the following categories:

Categories	*Weight*
Assignments	10%
Progress Reports	30%
Final Report	20%
Oral Presentation	10%
Professional behavior/class participation	5%
Quality of Completed Project	25%

Grading Scale

Grades are not curved in this course. Everyone can get an A! Your performance depends only on how you do, not on how everyone else in the class does. 25% of your grade depends on the quality of your completed project. The quality will be assessed by the project sponsor, Robin Wilson, and project directors, Carl Lawrence, Robert Wootten, and Prof. Shelly Miller.

A: EXCELLENT - Work performed in excess of requirements, consistently throughout the semester. Project successfully completed and scored a very high percentage of the possible course points. Typically scores > 90%
B: COMMENDABLE - Performed and produced more quality work than minimally required. Project successfully completed and scored a high percentage of the possible course points. Typically scores 80-90%
C: SUCCESSFUL - Work completed. Achieved minimum requirements. Project completed and scored a reasonable percentage of the possible course points. Typically scores 70-80%
D: MARGINAL - Work partly completed and/or turned in late and scored a minimal percentage of the of possible course points. Did not effectively contribute to the project. Typically scores < 70%

Grades will **not** be changed after they have been assigned at the end of the semester, except in extremely extenuating circumstances. So, if you have any questions about your scores on assignments, professional conduct, exams, reports, etc., that may affect your final class grade, you must ask/address them before the last day of class.