

MEEN5110/4110
Alternative Energy
Spring Semester 2008

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University of North Texas (UNT)

Course Project

Project Description:

The goal of this project is to determine and display the extent to which modern, efficient, sustainable technologies and residential interior design can be employed to reduce the environmental impact of residence hall life at UNT.

The UNT residence hall system maintains two model rooms within Crumley Hall to showcase the university's on-campus undergraduate accommodations to potential students and their families. One room is made up as a double, and the second room is a single. Both rooms are outfitted with conventional appliances, furniture, and fixtures consistent with unsustainable living and poor energy efficiency.

Students from UNT's Interior Design Program and the Mechanical and Energy Engineering Department will combine their skills, working together to audit and gauge the energy consumption and environmental impact the existing rooms would have if they were occupied. Once impact is determined, the teams will devise a new design and energy retrofit for one of the two rooms, demonstrating the level of improvement achievable via commercially available energy-efficient appliances, fixtures, and modern design.

Teams:

Six teams will be formed, and each team will address the course project concurrently. Teams will be composed of one MEEN5110/4110 student each with the rest of the members being from ART3650. Each team will have roughly the same number of members. The teams will work independently to audit the spaces and then compete to develop the most energy efficient, comfortable new room design.

Analyses Required:

Each team is expected to generate a comprehensive re-design of the rooms to maximize sustainability and occupant comfort. This redesign must include at a minimum: a) a bill of materials, appliances, and work needed to complete the retrofit; b) complete designs for the new space [including conceptual drawings of how the space will appear]; c) a comparative energy and sustainability audit juxtaposing the rooms before and after retrofit; and d) simple payback calculations to determine the duration to achieve total return on investment for the retrofit.

Working as the energy systems technical expert within the project teams, each MEEN 5110/4110 student must perform the following analyses in support of the overall design process:

A quantitative energy and sustainability audit of both model rooms that reflects their environmental impact if they were normally occupied. At a minimum, the following parameters must be estimated and quantified: a) annual water usage, b) annual garbage produced, and c) annual energy consumption. The energy consumption calculation should include local energy use in the room [i.e., power needed to run appliances, charge portable devices, provide illumination, etc.] and energy consumed by the building systems to maintain adequate comfort levels and process flows in the room [i.e., power consumed to remove heat dissipated by appliances, energy needed to warm water for the shower, energy expended to move fresh air into the rooms, etc.].

Deliverables Required:

The following deliverables must be completed by MEEN 5110/4110 students by the end of the semester:

1. A competitive oral and visual design review judged by a panel of experts. This review will occur on Tuesday, April 29, 2008. The winner(s) of this review process will have their design(s) implemented by UNT to showcase the benefits of sustainable living in the residence hall system. MEEN 5110/4110 students are expected to work with their teams to create these presentations. MEEN 5110/4110 students will receive the same grade as their ART 3560 team mates on this assignment. This score will be represented in the MEEN 5110/4110 grading scheme as a percentage of 25 total possible points.

2. A written quantitative project report, typed in double-spaced 12-point Times New Roman font with 1-inch margins, not to exceed 21 pages in length, and complete with tables, figures, and bibliography. The report will be due on Thursday, May 1, 2008, and it will carry a total of 25 possible points. This report will summarize the analyses and findings described above as well as highlight the energy, sustainability, and comfort attributes of the new room designs. Each MEEN 5110/4110 student will work independently to produce a unique report. Students should select a target energy industry or building technology journal before writing the report: the AEE Energy Engineering Journal, ASHRAE Journal, or similar edited publication. The report must be competent for submission to the target journal, and the style and format of the report should be consistent with the style guide of the target journal.

Students are encouraged to submit these reports to reviewed journals for possible publication. Any student whose report is accepted for publication in a reviewed and/or edited industry journal or related publication will automatically receive a grade of 'A' in MEEN 5110/4110.