Physics 391
Dumbach Energy Audit
Fall 2011

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Expectations: As part of a team, students will develop a plan to collect data for the study, complete assigned projects during the week and meet with instructors for one hour to report on findings. At the conclusion of the semester, students will issue individual reports over their work as well as a single team presentation making recommendations on how to proceed.

Assessment: Assessment will be based upon several aspects of student achievements. These are:

a) Appropriate participation in discussions
b) Presentations at weekly meetings.
c) Completion of action items in a timely manner.
d) Final report and team presentation
e) Building a portfolio

Learning Outcome:

- The student will develop an understanding on how professional engineers and architects approach an engineering problem.
  - First goal: Identify the problem
    - Dumbach 'should' use more energy than the new Cuneo Hall.
    - This problem creates two issues: one, the desire to be a green campus and good stewards of the environment and, two, the additional cost of requiring greater power.
  - Second Goal: Experimentally measure the problem
    - Measure the amount of power used by Dumbach as opposed to the new Cuneo Hall.
    - The data should not only identify the size of the problem, but also be split in such a way so that comparisons can be made
  - Third Goal: Learn use of professional tools to measure the problem.
    - Learn the use of Industrial Equipment to assess energy consumption
    - Learn about the operations and positioning of various probes placed in Dumbach to collect data
    - Learn what data is being input into the software
    - Learn how the data is fed – is it automatic or manual?
    - Compare the energy loss compared by other means (measurements of conductivity, area of cross-section, air flow, etc.) with the prediction of the software
  - Fourth Goal: Identify the key drivers that cause the problem
    - The students will need to identify the largest opportunities for power savings based on the measured data as well as the comparison to Cuneo Hall.
  - Fifth Goal: Discover solutions to the problem
    - The student will need to identify solutions to the problem and develop ways to test the solutions.
    - Since a key element of solving the problem will be to determine cost benefit vs. the required investment; the student will need to learn to estimate the cost of the investment and learn about the return of investment.
    - The student will also need to explore less effective solutions that may be more cost effective.
  - Sixth Goal: Communicate results and recommendations with leaders.
    - Most often, the engineers do not make decisions, but they present their results and recommendations to leaders which make the decisions.. In this case, it is likely that any such investment decisions will be made by facility leaders and the students will need to make a presentation that covers the relevant details, a more-detailed engineering report and be able to answer the manager's questions so that person can make the best decision for the university.
  - The individual bullets points under each goal are provided as example, the team (students, instructors and advisors) will develop and adjust these bullet points to meet the larger goals.