Benchmarking and Assessment of Building Energy Performance

Description: University or college senior-level undergraduate or graduate course, developed by ASHRAE, on building energy auditing and analysis using the ASHRAE Building EQ rating system as a learning framework. Students will experience project-based learning through hands-on engineering in real buildings under the guidance of industry professionals.

Format: The course is nominally three semester credit hours. It involves 10 weeks of classroom instruction followed by five weeks of hands-on field work in teams under the guidance of local industry mentors. The course is intended to revolve around a representative campus or community building for each student team that will provide the focus for the underlying technologies and techniques and the practical field studies.

Audience: Intended for students with previous coursework in both thermal sciences (or building physics) and building mechanical/electrical systems. Potential students could be in engineering, engineering technology, architecture, construction management, or environmental studies.

Content: Course content has been developed by ASHRAE and is freely available through ASHRAE student branches. Content includes learning objectives, lecture slides and notes, homework assignments, sample quizzes, and project template. Students will be expected to purchase some resources through ASHRAE with student discounts.

Delivery: The course is intended to be a partnership between local ASHRAE and an academic department and instructor. Through its local chapters and student branches, ASHRAE can provide professional mentors for student teams as well as a potential co-instructor with extensive domain knowledge for the course. The academic institution is expected to host the course within its normal offerings and promote the course as a project-based learning experience. Buildings for energy auditing could be provided through the institution's facilities management organization or could be drawn from local community facilities (e.g., homeless shelters, public housing, food banks).

Course Outline:

- Understanding building energy use
  - Understanding the role of buildings in global energy use
  - Understanding end-use energy consumption in buildings
  - Understanding the systems that provide a comfortable, healthy, and productive indoor environment
  - Understand the strategies to control building system performance
- Benchmarking of building energy performance
  - Characterizing building energy performance
  - Applying metrics for normalizing building energy performance
  - Comparing building types and their varying energy performance
  - Understanding utility rate schedules and energy billing data
- Performing an energy audit
  - Performing a preliminary energy use analysis
  - Measuring and monitoring building performance
  - Undertaking walk through analyses - Document reviews, interviews, documentation skills and safety requirements
  - Identifying key energy conservation and efficiency measures
- Assessing energy efficiency measures to improve building energy performance
  - Improvements to building fabric
  - Applied lighting technologies and applications of systems
  - HVAC system retrofits
  - Building energy monitoring and control systems
  - Integrated financial analysis energy efficiency measures
- Reporting for energy analysis and benchmarking
  - Using Building EQ to document performance and communicate opportunities for energy improvements
- Field study on assessments for improving building energy performance

For additional information and sample course material, visit the Educational Resources section of the ASHRAE Student Zone website: **www.ashrae.org/educationalresources**