

School of Management, Engineering and Technology
Department of Electrical Engineering and Renewable Energy
REE 439: Building Energy Auditing and Management

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| Catalogue Description (2010/2011): | Principles and applications of energy management in buildings, using auditing to identify opportunities for improving energy efficiency. Analysis of thermal and electrical loading of buildings and industrial processes; evaluation of electrical loading, timing and efficiency of load components. Improving efficiency of thermal and electrical loads, including economic analysis. Application of renewable energy in the analysis of loading and efficiency and effective means of tracking and managing energy use. |
| Hours/Credits: (Lecture-Lab-Total) | (3-0-3) |
| Class Schedule: | Once a week, for 2:50 hours. Offered in the Winter term. |
| Prerequisites: | MECH 433 |
| Required Text: | None. The class uses primary, current materials available free from multiple sources. |
| Reference Text: | Internet resources. |
| Course Coordinator: | Tom White |
| Regular Instructors: | Tom White |
| Course Objectives: | <p>Upon completion of the course, a student should be able to:</p> <ul style="list-style-type: none"> ▪ Apply and interpret energy codes and standards. ▪ Know the differences in the three levels of energy audits. ▪ Demonstrate how energy accounting can be used to identify and resolve energy inefficiencies. ▪ Understand the principles of energy utility charges and rate structures. ▪ Be able to perform simplified energy analysis for commercial and residential buildings using EUI information and utility billing data. ▪ Apply economic payback analysis methods to the application of energy systems. ▪ Understand the application of energy auditing instrumentation and building automation and control systems. ▪ Understand the factors that drive effective energy management strategies (client needs, regulations, and available resources). ▪ Describe the role of commissioning in ensuring persistence of energy savings. ▪ Prepare an energy assessment report, in the style of a consulting engineering study, complete with analysis, documentation of findings, recommendations, and reference information that is oriented for a lay client audience. |
| Topics Covered: | <ul style="list-style-type: none"> ▪ Introduction, syllabus review. Team organization and project management principles. Energy use in buildings. Overview of energy auditing and management. ▪ Audit case study. Utility billing rate structures and real-time energy management. ▪ Review of auditing and energy management practices. Energy accounting and Audit Levels 1, 2 and 3; EPA Portfolio Manager and Energy Star Certification. ▪ Developing audit checklists and protocols. Preparation for energy audits. Interview focus with maintenance/engineering staff. ▪ Data logging and trend analysis. ▪ Preview of a real-time energy tracking system. ▪ Data collection and analysis techniques; estimating energy savings. ▪ Conducting energy audits; data assessment, reduction, analysis. ▪ No cost/low cost O&M (operations and maintenance). ▪ Performance contracting for energy savings. ▪ Economic analysis of Energy Efficiency Measures (EEMs). ▪ Commissioning methods and diagnostic tools. Content review for audit reports. ▪ Presentations and recommendations to building owner/managers. |
| Relevant Program | (a) an ability to apply knowledge of mathematics, science, and engineering |

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| Outcomes: | (b) an ability to design and conduct experiments, as well as to analyze and interpret data (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (d) an ability to function on multi-disciplinary teams (e) an ability to identify, formulate, and solve engineering problems (g) an ability to communicate effectively (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (l) an ability to apply the fundamentals of energy conversion and applications | | |
| Required or Elective: | Required | | |
| Criterion 5: | Engineering Topics | | |
| Prepared By: | Tom White | Updated: | 5-4-10 |