# Course Syllabus

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<thead>
<tr>
<th><strong>Course Title:</strong></th>
<th>Commercial Energy Use Analysis &amp; Simulations</th>
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<tr>
<td><strong>Department:</strong></td>
<td>STEAM</td>
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<tr>
<td><strong>Curriculum:</strong></td>
<td>Tech Studies: Energy Management Option</td>
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<td><strong>Date submitted:</strong></td>
<td>May 2020 (AAC: 20-21)</td>
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## Course Code: (eg. ACC 101) NRG 241

### Course Type:
- A: Clinical
- B: Lab
- D: Distance Learning
- I: Individual/Independent
- L: Lecture
- N: Internship
- M: Seminar
- P: Practicum
- U: Studio
- X: Combined Lecture/Lab
- Y: Combined Lecture/Studio

### Elective Type: G

### Credit Hours: 3

#### Contact Hours:
- Lecture: 1
- Clinical: 0
- Lab: 3
- Studio: 0
- Other: 0
- **TOTAL:** 4

#### Class Maximum: 24

#### Semesters Offered: Sp/F

## Prerequisites:
- C- or higher in NRG 122 – Commercial HVAC Systems and Controls AND NRG 123 – Energy Efficiency Methods

## Corequisites:
- None

## Other Requirements:
- None

## Catalog Course Description:
Provides students with exposure to the entire energy analysis process work flow with a “hands-on” implementation of an actual building energy study and an energy modeling using Building Information Modeling and AutoDesk Revit, eQuest software and other specialized modeling tools.

## Topical Outline:
- Introduction to course and overview of skills to be developed, energy use in commercial buildings and common metrics such as Energy Utilization Intensity (EUI)
- Introduction to schematic design energy modeling using eQuest
- Schematic design parametric energy analysis studies using eQuest
- Introduction to Building Information Model (BIM) design and energy modeling
- BIM based parametric energy design studies
- Full energy modeling work flow
- Introduction to conducting commercial building ASHRAE Level 1 and 2 energy audits
- Introduction to data logging application and analysis
- Subject building design document review, audit and data logger deployment
- Subject building BIM modeling and full modeling work flow integration
### Outcomes:

Describe measurable skills or knowledge that students should be able to demonstrate as evidence that they have mastered the course content.

- Subject building Energy Conservation Measure (ECM) parametric modeling studies
- ECM financial analysis and feasibility methods
- Subject building results presentations

### Upon successful completion of this course, the student will be able to:

- distinguish between different activities involved in a comprehensive energy analysis effort, i.e., plan review, walk-through, identification of Energy Conservation Measures (ECMs), cost estimating, energy savings calculations and report writing
- demonstrate an understanding of the preparation requirements for doing a commercial building energy analysis
- use appropriate energy audit forms and develop good record keeping habits.
- demonstrate an understanding of, recognize, and describe major energy using systems found in typical commercial buildings
- use common auditing and field measurement instruments during actual audit
- show familiarity with a broad range of energy conservation measure technologies
- prepare cost estimates for at least one energy conservation measure
- show familiarity with good cost estimating techniques for energy conservation measures
- calculate savings for at least one energy conservation measure
- distinguish between the commonly used methods for computing energy savings for energy conservation measure including manual methods (hours of operation and connected load), variable degree-day calculations, bin methods and hourly simulations

### TECH STUDIES PROGRAM, ENERGY OPTION:

(Numbering reflects Program Outcomes as they appear in the college catalog)

6. identify energy conversion processes and their relation to engineering and technology
7. demonstrate technical competency in a functional area of technology.

The specialization may include, but is not limited to: electricity, computer aided drafting and design, manufacturing, and construction.

### GENERAL EDUCATION:

(Numbering reflects General Education Outcomes as they appear in the college catalog)

None

### Evaluation:

List how the above outcomes will be assessed.

- Class Assignments
- Scoping Report
- Class Project
- Final Presentation

### Instructional Resources:

List library (e.g. books, journals, online resources), technological (e.g. Smartboard, software), and other resources (e.g. equipment, supplies, facilities) required and desired to teach this course.

Computer classroom
Suggested Student Resources:

- Procedures for Commercial Building Energy Audits, 2nd Edition (ASHRAE)
- Building Energy Simulation Guidelines Packet
- eQuest Software (provided on CD by instructor)
- DOE2.2. Documentation (provided on CD by instructor)
- AutoDesk Revit, provided on workstations an from Autodesk student license download
- Energy Analysis Resources (provided on CD by instructor)
- Integrating Energy Engineering & Performance Modeling into the Design Process
- Various hand-outs (by instructor)