

**MECHANICAL ENGINEERING PROGRAM**

**ABET COURSE SYLLABUS**

**ME 458: Building Heating and Cooling Loads (4) Required for HVAC&R Concentration,  
Elective for all others**

**Course Description:** (2013-15 Catalog) Building heating and cooling load calculations, estimating energy consumption and operating costs for heating, ventilating and air-conditioning system design and selection. 3 lectures, 1 laboratory.

**Prerequisite Courses:** ME 303, ME 343

**Prerequisites by Topic:** Coverage of all topics presumes completion of basic engineering science courses in thermodynamics, fluid mechanics and heat transfer.

**Textbook:** (and/or other required material) ASHRAE Handbook: Fundamentals, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2013.

**Course Coordinator/Instructor:** Jesse Maddren, Professor of M.E.

- Course Learning Outcomes:**
1. To be able to understand and analyze psychrometric processes involved in HVAC systems.
  2. To be able to apply basic engineering sciences in the calculation of peak heating and cooling loads for a building.
  3. To introduce students to energy modeling for buildings and mechanical systems.
  4. To introduce students to the HVAC&R profession.
  5. To improve understanding of contemporary environmental issues and how they relate to building energy use.

<b>Relationship of Course to MECHANICAL ENGINEERING Program Outcomes:</b>												
<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>
<b>H</b>	<b>L</b>	<b>M</b>	<b>L</b>	<b>H</b>	<b>M</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>H</b>	<b>H</b>	<b>M</b>

- Topics Covered:** (recommended number of hours each)
1. Introduction to calculating building loads (1 lecture)
  2. Heat transmission through envelope (4 lectures)
  3. Solar radiation (2 lectures)
  4. Fenestration (2 lectures)
  5. Ventilation and infiltration (1 lecture)
  6. Psychrometrics (4 lectures)
  7. Climatic design information (2 lectures)
  8. Thermal comfort (1 lecture)

9. Non-residential load calculations (4 lectures)
10. Energy estimating and modeling (4 lectures)
11. System selection (3 lectures)
12. Review (1 lecture)
13. Testing (1 lecture)

**Laboratory Projects:**

1. Project- Atascadero Municipal Water District Bldg (6 weeks)
  - a. Reading plans, area take-offs (1 week)
  - b. Internal loads, constructions (1 week)
  - c. Introduction to Trace 700 (2 weeks)
  - d. Results checking (2 weeks)
2. Mass and energy balances for computer lab (1 week)
3. Field trip (1 week)
4. Transient heat transfer through roof (2 weeks)

**Class/Lab Schedule:**

Three 50-minute lectures per week. One 170-minute lab per week

**Contribution of Course to Meeting the Professional Component:**

- |   |           |
|---|-----------|
| (a) College-level mathematics and basic sciences: | 0 credits |
| (b) Engineering Topics:                           | 4 credits |
| (c) General Education:                            | 0 credits |
| (d) Other:  | 0 credits |

**Prepared by:** Jesse Maddren **Date:** 4-3-14