INSTRUCTOR
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CLASS LOGISTICS
Meeting time: CDS 141, T/Th: 3:00 – 4:15 pm
Office hours: My office SOS 422, T/Th: 9:00 am- 11:30 pm

PREREQUISITE
Admission to Master of Science in Built Environment (MSBE) program or consent of instructor.

GENERAL DESCRIPTION
The purpose of this class is to teach scientific and engineering principles of various mechanisms affecting heat loads in buildings. This involves methods of calculating building peak heating and peak cooling loads, annual energy estimation methods, human comfort and indoor air quality, ventilation and air infiltration into buildings, solar loads on buildings, and windows and fenestration systems. State-of-the-art design methods used by the professional community as well as pertinent standards will be covered. Team work will be emphasized by means of a design project involving the use of a widely used detailed building energy simulation program.

LEARNING OBJECTIVES
- Familiarity with the important need to reduce energy use in buildings- better design and operation
- Apply principles of heat transfer and thermodynamics to heat flows in buildings
- Determine solar irradiation on surfaces
- Describe lighting technology and daylight use
- Calculate air infiltration rates into building structures
- Calculate the various components which constitute peak heat loads in buildings
- Calculate the various components which constitute peak cooling loads of buildings
- Familiarity with dynamic methods to predict building response using network models
- Analyze human comfort, and determine necessary indoor conditions to achieve it
- Describe effect of indoor air pollutants and ways to control them
- Calculate annual energy use of simple buildings based on degree-day methods

TEXTS AND REFERENCES
**Required textbook:** Copies of all my slides will be posted on blackboard


**References (additional texts): to be kept in the reserve section of The Design School library**

ATTENDANCE POLICY
Students are expected to attend every class. More than two unexcused absences will reduce overall grade. If an absence is necessary, it should be discussed with the instructor prior to the class date.

EVALUATION
All assignments and final project must be completed and submitted in order to obtain a final grade. Late submittals will be reduced by a letter grade. Submittals later than one week following the due date will not be graded. Extra credit assignments will also be offered.

GRADING POLICY
- Homework: 30%
- Mid-term exam: 20%
- Final exam: 20%
- Project/software assignment: 25%
- Attendance/Participation/Seminars: 5%

>=90% is A; >=80 and <90% is B, >=70 and <80 is C, >=60 and <70 is D, <60 is E

SCHEDULE: Tentative
Please anticipate revisions to the schedule as the course progresses.

<table>
<thead>
<tr>
<th>Week</th>
<th>Module</th>
<th>Topics</th>
<th>Reading from text</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>Intro to energy use in buildings, conservation</td>
<td>Chap.1 + SM*</td>
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<tr>
<td>2+3</td>
<td>B</td>
<td>Review of heat transfer (conduction, convection, radiation)</td>
<td>Chap. 2</td>
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<tr>
<td>4+5</td>
<td>C</td>
<td>Solar radiation</td>
<td>Sections 6.1 – 6.4</td>
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<td>6</td>
<td>D</td>
<td>Optics, windows and daylighting</td>
<td>Section 6.5 + Chap.13</td>
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<td>7</td>
<td>E</td>
<td>Fluid flow, pressure drop, passive ventilation in buildings</td>
<td>Section 7.1+ SM</td>
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<tr>
<td>8</td>
<td></td>
<td>Mid-term exam</td>
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<tr>
<td>9</td>
<td>F</td>
<td>Heating load calculations</td>
<td>Section 7.2 – 7.5</td>
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<tr>
<td>10</td>
<td>G</td>
<td>Unsteady state heat transfer, dynamic models of buildings</td>
<td>Section 8.2 + SM</td>
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<tr>
<td>11-12</td>
<td>H</td>
<td>Cooling load calculations (unsteady)</td>
<td>Sections 7.6 – 7.8 + SM</td>
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<tr>
<td>13</td>
<td>I</td>
<td>Annual energy use methods</td>
<td>Section 8.1 + SM</td>
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<td>14</td>
<td>J</td>
<td>Thermal comfort + Indoor air quality</td>
<td>Section 4.5+ 4.6 + SM</td>
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<td>15</td>
<td></td>
<td>Project presentations</td>
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- SM- supplementary material