Syllabus
Prerequisite: 18.01/18.01A
3-1-5 Grad Credit

Explores aspects of climate relevant to building design, and applies concepts and methods to energy efficient and environmentally responsible building design.

Topics include climate and comfort parameters, energy systems, and environmental implications of building. Advanced structural design topics are treated. Emphasizes practical applications for building environmental and structural design. Required of M. Arch students.

How to design an energy efficient and environmental friendly building is challenging. In this course, we will explore aspects of thermal phenomena, thermal comfort, indoor air quality, and climate relevant to building design, and apply concepts and methods to energy-efficient and environmental-friendly building design. Topics include thermodynamics, psychrometrics, comfort, indoor air quality, climate, solar radiation, space heating and cooling loads, energy analysis, passive heating and cooling systems, and active HVAC systems. We will emphasize a quantitative understanding of energy fundamentals, examples from practice, and design exercises.

The final segment of 4.464 will consist of a focused study of a particular type of advanced structure - the tall building. This building type poses challenges for the engineering and design of a structure that safely accommodates the large populations that use them. During the past several decades numerous important advances in structural morphology, materials and construction processes have placed this building type at the leading edge of building design and engineering. By closely examining these advances, this portion of the course intends to bring the student closer to the real-world process of collaborating in the design of large and complex buildings. The current design of the World Trade Center Site in New York City will be used as a case study.

Class Meetings:
Lectures: Mondays and Wednesdays 11:00-12:30 pm in Room 2-147
Lab project: Reviews will be in the corridor of Studio 5 and desk critiques will be in the Building Technology office (Room 5-418).

Instructors:
Leon Glicksman, Room 5-418: Phone 617-253-2233
Dan Arons, Room 5-418, Phone: 617-851-6867, Email: darons@alum.mit.edu
Office Hours: By appointment Mondays and Wednesdays
Teaching Assistant:
Gang Tan, Room 3-412, Phone:253-7628, Email: gangt@mit.edu
Office Hours: Mondays and Wednesdays 12:30 – 2:00.

Texts:

Further Readings:
Stein, Benjamin and Reynolds, John S., Mechanical and Electrical Equipment for Buildings, Wiley and Sons

ASHRAE Handbook of Fundamentals


Course Grading:

Grades will be determined on the following basis
30% Two quizzes at 15% each
30% Homework and class participation
40% Design project in two parts.

Grades on late work without prior approval of the instructors will be significantly discounted.