



ME 288 January-April 3:0

Air Conditioning Engineering

Instructor

Dr. G.S.V.L. Narasimham
Email: gsvln@iisc.ac.in

Teaching Assistant

Email:

Department: Department of Mechanical Engineering, IISc, Bangalore-560012

Course Time: Tuesdays and Thursdays, 1.5 hours each day, Total number of contacts: typically 25

Lecture venue: Mini Class Room, Second Floor, Department of Mechanical Engineering

Detailed Course Page:

Announcements

Brief description of the course

Mechanical, civil, chemical, aerospace, architecture and other students who wish to sharpen their knowledge about air conditioning can take this course. The course gives solid foundation in both the principles and application of air conditioning. Background in basic thermodynamics, fluid mechanics and heat transfer is desirable. However, the required background is also covered briefly in the course for the benefit of students.

Prerequisites

Knowledge of basic thermodynamics, fluid mechanics and heat transfer is desirable.

Syllabus

Definition of air conditioning and applications in various fields. Properties of moist air: composition of dry air, standard atmosphere, humidity ratio, specific volume of moist air, dew/frost point temperature, adiabatic saturation, thermodynamic wet/ice bulb temperature, etc. Properties of moist air using the real gas properties. Theory of the psychrometer: aspiration and sling psychrometers. Construction of the Mollier and Carrier type psychrometric charts. Various air conditioning processes. Room energy balances. Wetted surface heat and mass transfer equipment such as cooling towers, cooling and dehumidifying coils and evaporative condensers.

Air conditioning systems: single and multizone, double-duct, perimeter induction, air-water and packaged, constant and variable air volume systems. Thermal comfort and Fanger's theory. Measurement of various quantities related to thermal comfort. Cooling load calculations with methods like CLTD and lag-factor. Duct design by velocity reduction, equal friction, static regain methods. Performance and selection of fans for air movement. Air conditioning controls (like cooling coil control, sequential or otherwise, outdoor air control, etc.)

Course outcomes

Upon completion of this course, students will have a solid background in all (i.e. fundamental and applied) aspects of air conditioning. The knowledge gained will be useful in their further studies or to become an independent consultant on air conditioning.

Grading policy

Typically 75% for examinations and 25% for assignments.

Assignments

The assignments are problem sheets on various topics plus computer assignments for the design of equipment like cooling towers, cooling and dehumidifying coils, etc.

Resources

I have developed lecture notes which is exactly suitable for the chosen syllabus and the level (typically Masters degree level). These handouts are made available to the students. Apart from this, the students are encouraged to read ASHRAE handbooks and textbooks authored by W. P. Jones, Stocker and Jones, Threlkeld, etc.