



**ME 289 August-December 3:0**

## **Principles of Solar Thermal Engineering**

### **Instructor**

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### **Teaching Assistant**

Email:

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

Course Time: Usually Tuesdays and Thursdays, 1.5 hours on each day; Total number of contacts typically 27-29

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

Detailed Course Page:

### **Announcements**

### **Brief description of the course**

The course does not presuppose any familiarity with solar energy. Knowledge of fluid mechanics and heat transfer is desirable but not necessary as the same will be covered in the course. Both Masters and Ph.D. students of any department can take the course.

### **Prerequisites**

None

### **Syllabus**

Facts about sun and earth, sun-earth geometry: horizontal system of coordinates, equatorial system of coordinates, relation between the two systems, sunrise and sunset on horizontal and inclined planes, the reckoning of time, equation of time, relation between local apparent solar time and the local mean solar time (indian standard time), solar radiation: beam, diffuse, reflected radiations; measurement and prediction of solar radiation, flat plate collectors, air collectors, evacuated tubular collectors, parabolic troughs and dishes, compound parabolic collectors, solar towers, Applications such as solar-electric power generation, solar cooling, drying, desalination, cooking, solar thermal energy storage, solar economics.

## **Course outcomes**

The students will have solid foundation in the fundamentals. With the knowledge gained in this course, they will be able to go through any advanced literature and understand.

## **Grading policy**

Typically 75% for 2 mid-term examinations and 1 final examination and 25% for seminar on an assigned topic.

## **Assignments**

Assignments are concerned with the heat loss calculations from flat plate collectors and performance of parabolic troughs. These are to be carried out by developing a computer code (in any language) for the purpose.

## **Resources**

The instructor has, over the years, developed course work material exactly suitable for the course. The material is at a level suitable for Masters and Ph. D. students. It is neither too elementary nor too advanced. The material is made available for the students. Apart from this, the students are encouraged to read books by Kreith, Kreider and Goswami; Duffie and Beckman, and Sukhatme and Naik plus important published journal papers.