

# DESIGN OF SOLAR ENERGY SYSTEMS

## COURSE DESCRIPTION:

This course emphasizes the creativity of the design process and systems approach to the design. It includes system conceptual design, design of major components and overall system design based on application of physical principles to the solar system design. The process includes idea generation, concept selection and estimation, design of major components, and overall system design. Solar radiation data. Design of solar thermal systems for water and space heating and cooling, power generation. f-Chart calculation method for sizing solar water and space heating systems. Design of non-focusing and focusing collectors, heat storage. Design of photovoltaic off-grid and grid-connected power systems incl. system components - PV modules, batteries, charge controllers, inverters, auxiliaries. Performance analysis of a photovoltaic system, estimation of its economics. Using software codes for design of solar thermal and photovoltaic systems. Application examples

## REFERENCE BOOKS:

1. Duffie J.A. and Beckman W.A. Solar Engineering of Thermal Process, Wiley, 3rd ed., 2006.
2. Da Rosa A.V. Fundamentals of Renewable Energy Processes, 2nd ed., Academic Press, 2009.
3. Kalogirou S.A. Solar Energy Engineering: Processes and Systems, Academic Press, 2009.
4. Sen Z. Solar Energy Fundamentals and Modeling Techniques, Turkey, 2008
5. Vogel W., Kalb H. Large-Scale Solar Thermal Power Technologies, Wiley-VCH, 2010.
6. Dincer I., Rosen M. Thermal Energy Storage, 2nd ed., Wiley, 201

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