**Green Energy and Climate Modeling**

**Course Outline:**

**Introduction:** Man and energy, world production and reserve of conventional energy sources, Indian production and reserve, alternative energy sources.

**The greenhouse effect**: Physics behind greenhouse effect , Blackbody radiation, layer model depending on energy flux and temperature at earth surface, radiation effect on Greenhouse gases, temperature structure of the atmosphere, Heat, pressure and adiabatic expansion, winds, and currents, feedback mechanism. **The Carbon Cycle**: The Carbon Cycle and Climate, The Biosphere in the Carbon Cycle, Fossil Fuels, Effect of Conventional energy sources, Human Impact, How Much CO2 is Too Much?

**Solar energy**: Nature and availability of radiation, estimation of solar energy radiation. Effect of receiving surface, location and orientation, heat transfer consideration relevant to solar energy, Characteristics of materials and surface used in solar energy absorption. Device for thermal collection and storage.

**Ocean Energy:** Tidal energy, and its characteristics, tidal energy estimation, important component of tidal energy plant, single basin plant, double basin plant, turbine, tidal power plant development in India, wave energy, design parameters of wave energy plant, introduction and working principle of ocean thermal energy conversion,

**Fusion Energy**: Basics of DT fusion, Magnetic confinement fusion, laser inertial fusion, present status of the proposed fusion reactors and future scope at international and national level.

**Wind Energy and Bio Mass energy:** introduction to wind energy, Nature, power, forces, conversion and estimation. Components of wind energy system types, safety and environment, Introduction to bio mass energy, generation, conversion and utilization of biogas plants and gas fiers, fuel cell technologies.

**Text Books**

Global Warming : Understanding the forecast by David Archer, Wiley.

Bansal Keemann, Meliss, renewable energy sources and conversion technology, Tata Mc Graw Hill

Kothari D.P. renewable energy resources and emerging technologies, Prentice Hall of India Pvt

**Reference Books**

Rai G D, Non-conventional energy sources, Khanna Publishers

Duffie J A & Beckmann W A, Solar engineering of thermal process, Wiley-International Publication