NON-CONVENTIONAL ENERGY RESOURCES

PROF. PRATHAP HARIDOSS

Department of Metallurgical and Materials Engineering

IIT Madras

PRE-REQUISITES : Course will be accessible to most students who have completed their first two years of study at an Undergraduate level.

INTENDED AUDIENCE : Interested students

COURSE OUTLINE :

This course looks at the operating principle of a range of non-conventional energy resources, materials used, characterization, and key performance characteristics. The technologies looked at will include, Solar energy, Wind, Batteries, Fuel cells, and Geothermal conversion. The advantages and limitations of these technologies in comparison to conventional sources of energy will also be examined.

ABOUT INSTRUCTOR :

Prof. Prathap Haridoss is a Professor in the Department of Metallurgical and Materials Engineering at IIT Madras. He works in the areas of Fuel Cell and Carbon nanomaterials. He has a B.Tech in Metallurgical Engineering from IIT Madras, and a PhD in Materials Science and Engineering from the University of Wisconsin-Madison, USA. Before he joined as a faculty at IIT Madras, he served as a Senior Scientist at Plug Power, a Fuel Cell company in New York. He has 3 US patents, several International Journal publications, and has published a book titled "Physics of Materials, Essential Concepts of Solid State Physics".

COURSE PLAN :

Week 1**:** Scale of quantities, Impact of current energy usage, Conventional sources of energy

Week 2**:** Overview of non-conventional energy resources, Consumption by sector

Week 3**:** Solar energy incident on earth, solar spectrum

Week 4**:** Overview of solar energy technologies, Solar Thermal devices

Week 5**:** Solar Photo-voltaic devices, Performance and durability of solar devices

Week 6**:** Wind energy, technology and geographical aspects

Week 7**:** Geothermal and Biomass

Week 8**:** Battery basics, types

Week 9**:** Testing, performance of batteries

Week 10**:** Fuel cell types, Fuel processing, concept to product.

Week 11**:** Characterization and durability of fuel cells

Week 12**:** Flywheels and super capacitors