Phy301: Energy: First Handout - 2021-1

Course Objectives

This course aims to provide a broad overview of the use of energy by humans and human societies to sustain themselves from prehistory to the present**.** The student is expected to get an understanding of the role fossil fuels have played in building up our civilization in recent history and its consequences. The pros and cons of renewable and alternative sources of energy would also become clear by the end of the course. Recent issues such as rising CO_2 levels in the atmosphere, global warming, sea level rise *etc*. will also be examined in some detail.

Prerequisites

None

Course Contents

- Energy in earth's biosphere: Sun, Wind & Rain, Geothermal energy, Photosynthesis, Heterotrophs, Ecosystems
- Energy in human history: Hunting and Gathering, Agriculture, Biomass fuels, Transportation and Manufacturing
- Fossil Fueled Global Civilization: Coal, Oil, Gas. Electricity
- Renewable and alternative sources of energy: Hydroelectricity, Wind energy, Solar energy, Geothermal energy, Ocean energy & Biofuels
- Environmental Consequences : CO_2 & Global warming, Sea level rise.

Special Topics

CO_2 and global warming, depletion of fossil fuels and the the long term adverse consequences of its use, fossil fuels and our prosperity, energy transitions in human history, population explosion, nuclear fission as a source of energy and its difficulties, carbon sequestration, the problems of wind and solar energy, biofuels and their dangers, CO_2 and life on earth, ice ages in earth's history.

Lectures & Venue

There will be about 30 lectures plus a few problem solving and discussion sessions totalling about 40 contact hours.

Classes will be held online on Mondays, Wednesdays and Fridays from 09:00 to 09:50 hours.

Class Website & Discussion Forum

Details of the class website and discussion forum will be provided later.

Evaluation

- Fortnightly quizzes: 20% marks
- Mid-Sem: 30% marks
- End-Sem: 50 % marks
- Grading will be relative.

Books & References

1. Energy: a Beginner's Guide, 2nd Ed by Vaclav Smil (2017)
2. World wide web (Wikipedia, Youtube, ...). Specific links will be provided at the discussion forum and also in the lecture materials.
3. Encyclopedia of Energy, Elsevier (2004) (Available through sciencedirect)
4. Statistical Review of World Energy 2020: Published by BP & freely downloadable from the internet.