

Physics: Course #2:
Elementary Physics of Energy

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214 ISB

Office Hours: Tuesdays 4:30-5:30 ISB 214

Syllabus: Our course will follow the book by Ristinen and Kraushaar in large part.

Energy fundamentals, units of energy, renewable vs non renewable energy
Heat Engines, thermodynamic considerations, generation of electricity and its transmission

Fossil fuels, formation of coal and fossil fuels, historical consumption rates and impending crisis

Renewable energy, solar energy and its collection, elements of solar cells and semiconductors, spectroscopy of simple atoms and molecules.

Alternative renewable energy sources: including hydropower, wind power, ocean thermal energy, tidal and biomass

Basics of nuclear energy: Nuclear reactors, fuel cycle, Fusion reactors, Energy production in the Sun.

Waste energy recovery, Fuel cells and hybrid vehicles, air pollution
Global effects, Greenhouse effect and thermodynamics.

Reading list:

The course will be at the level of the book “Energy and the environment”, by R A Ristinen and J J Kraushaar (Wiley), with a somewhat greater emphasis on the physics of the various topics. The book has a good homework problems that we will address in this course. However, since the book has few equations, some supplementary book on physics might be useful to actually do the problems, in addition to the class work.

A useful supplementary book with more equations and formulas is ENERGY: Physical, Environmental, and Social impact, by Gordon J. Aubrecht (Pearson).

Another book that we will refer to is “Sustainable Energy Without Hot Air” by D. J. C. MacKay, (UIT, Cambridge). This book is available for free download and a copy can be found on my website.

Another supplementary book, for the general knowledge of the students rather than a course requirement, is the Physics for Future Presidents by Richard A Mueller.