**PHY 399: Alternative energies**
**Instructor: R. Koenenkamp, rkoe@pdx.edu, 5-4224, office: 402 SB2**

**Tuesdays & Thursdays 12:00-13:50 p.m.**
**104 Science Bldg. 2**

**Overview:**

**I. Intro**
energy and energy conversion

**II. Solar energy**
the sun
radiation from the sun
the greenhouse effect
solar thermal energy
photovoltaic energy
wind energy

**III. Other alternatives**
tidal power

**IV. System analysis**
learning curves
economics
policies (costs, incentives)

**Abstract:**
In modern societies energy production has been a key to productivity, wealth, progress and comfort. However, as technology spreads around the globe, its spoils threaten the environment. Climate, political freedom and biodiversity seem to be in conflict with conventional energy schemes.
Alternative energies may offer a safer path into the future. In this course the underlying physical principles of solar, wind, tidal and other alternative energies will be explained. The advantages of an integrative, adaptive and decentralized technical approach will be pointed out, and realistic scenarios for a transition from the status quo towards more sustainable energy generation will be described.
While the emphasis in this course is on basic physical and technical ideas and concepts, economic, social and political issues will also be discussed.

**recommended: calculus, PH 213, 223**

**recommended (not mandatory) books:**

**J. Twidell: Renewable Energy Resources (Taylor and Francis, 2005, paperback)**
**J. Andrews: Energy Science (Oxford, 2007, paperback)**

**Grading: 20% HW, 40% midterm, 40% final exam**