Physics 190E – Energy & Society

By David Kastor

Few people would question the need for UMass to offer a course that teaches students at large about energy. But, who should teach such a course? The subject of energy is inherently interdisciplinary. Fossil fuels, how they were formed, where they are found and in what quantities – these seem like topics for a course in geosciences. How we get energy from fossil fuels involves chemistry. Solar energy & wind power – these seem like topics for engineers. Rising CO_2 levels and global warming seem like topics for climate scientists. Moving further afield into the roles of energy in our society, one enters the realms of economics, political science and planning.

Nonetheless, such a course needs a home in the University, and the Physics Department is an ideal spot for it. After all, energy is at the root of our subject. Physicists have long experience teaching about energy in its many different forms. Beginning the first day in classical mechanics, we talk about kinetic energy and gravitational potential energy. Later on, we talk about electrical energy, nuclear energy, chemical energy, light. If students are still listening, we'll happily tell them about the 70% of the contents of the universe, dark energy, that we don't understand at all.

Physicists are the natural ones to talk about thermodynamics, the laws that govern how energy moves between different forms. We can explain why, even though the first law says that the total amount of energy always stays the same, the second law says that we still need to worry about conserving energy. We are also happy to explain global warming, which comes from small alterations to the energy balance between the Earth and the Sun.

Physics 190E – Energy & Society, was first proposed and taught by Mark Tuominen. Most recently, in Fall 2007, I taught the course to a collection of 80 some students from a wide variety of majors - English, theatre, business, etc. In addition to problem sets, that would look familiar to physics majors, the course required 3 written papers, an unusual feature in physics courses. Students picked topics for these papers from lists that covered a wide range of energy topics that were touched on in the course – oil supplies in Saudia Arabia, hybrid cars, geothermal power, China's energy strategy. For those interested, materials for the course are posted on my website (people.umass.edu/kastor).

It's worth adding that the energy course is just one of a growing portfolio of gen. ed. Classes offered by the Physics Department that aim to introduce our subject to a wider audience through facinating topics. In addition to the energy course, students can take course with titles such as "From the Big Bang to Black Holes", "Seeing the Light" and "Einstein's Dice." One sociology major taking the energy course told me that it was the third physics gen. ed. he'd taken.