Syllabus

Course Name: Physics of Contemporary Challenges

Course Number: PH 315

Course Credits: 3

Meeting Times: The course meets three days per week (Monday, Wednesday, Friday). Each meeting time is 50 minutes.

Prerequisites, Co-requisites: PH211 and PH212 are prerequisites. It is preferable for students to have also completed PH213.

Course Description: An introduction to thermal physics and quantum physics in the context of contemporary challenges faced by our society, such as power generation, energy efficiency, climate modeling and space exploration.

Course Content:

Contemporary challenges: sustainable energy sources, energy efficiency, climate change mechanisms, space exploration, puzzles in fundamental physics.
Physics concepts: energy transformation, laws of thermodynamics, electromagnetic radiation, quantum mechanics & probability, wave-particle duality, fission and fusion
Physical reasoning: Fermi estimates, fundamental physical limits, dimensional analysis, differentiating/integrating, interpreting graphs, differential equations.

Course Specific Measurable Student Learning Outcomes:

Students will be able to:

- Identify and apply physical laws that place practical and fundamental limits on physical processes
- Estimate the order of magnitude of physical phenomena
- Describe the role of physical reasoning in solving contemporary societal challenges
- Use experimental data to calculate single-variable derivatives and integrals
- Interpret multi-variable symbolic equations, differential equations, and graphs to describe linear and non-linear functional relationships in physical systems
- Use dimensional reasoning to make sense of graphs and equations

Evaluation of Student Performance:

Homework - 25%
Midterm - 20%
Term paper - 15%
Final exam - 40%

Learning Resources:

There are three required textbooks

- "Sustainable Energy Without the Hot Air" by David MacKay (free pdf download)
- "Six Ideas That Shaped Physics Unit Q" 3rd Edition by Thomas Moore.
- "Six Ideas That Shaped Physics Unit T" 3rd Edition by Thomas Moore.

Statement Regarding Students with Disabilities:

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Student Conduct Expectations link:

http://studentlife.oregonstate.edu/code

Reach Out for Success:

University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with an instructor or academic advisor. Learn about resources that assist with wellness and academic success at oregonstate.edu/ReachOut. If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline at 1-800-273-TALK (8255)

Student Evaluation of Courses:

The online Student Evaluation of Teaching system opens to students the Monday of dead week and closes the Monday following the end of finals. Students will receive notification, instructions and the link through their ONID. They may also log into the system via Online Services. Course evaluation results are extremely important and used to help improve courses and the learning experience of future students. Responses are anonymous (unless a student chooses to "sign" their comments agreeing to relinquish anonymity) and unavailable to instructors until after grades have been posted. The results of scaled questions and signed comments go to both the instructor and their unit head/supervisor. Anonymous (unsigned) comments go to the instructor only.