

Abilene Christian University
Course Syllabus

Physics 102 (three hours credit)
Physical Science

Spring 2012
9:30 TR, S350

Professor: Michael E. Sadler, Ph.D.
Office: 320B Foster Science Building
Office hours: 9:15-11:00 MWF, 2:30-5:00 MF, appointment (or my door is open)
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Text: Energy: Its Use and the Environment, by Roger Hinrichs and Merlin Kleinbach

Grading:	Homework	20%
	Short quizzes and class exercises	30%
	Hour exams (2)	30%
	Final exam (1:30 Monday, 7 May 2012)	<u>20%</u>
		100%

Course Objective: The objective of this course is to make the student more aware of the nature of the physical universe and of the implication of physical laws on our lives. As a means to accomplish this objective, the concept of energy will be discussed from physical and environmental perspectives. Topics will include 1) physical principles as they relate to the societal use of energy, 2) consequences of finite energy resources, 3) analysis of near- and long-term energy resources, including fossil fuels, nuclear, solar and other alternatives, and 4) technology of energy conversion alternatives and the trade-offs involved in their societal deployment. We will cover the chapters in the text sequentially except chapters 15, 17, and 18. That translates to one chapter per week.

This course will emphasize reading and understanding concepts but also be quantitative (involve numerical problems). Mathematics is the language of science. It is necessary to be quantitative in order to understand the physical nature of energy, exponential growth, and the implications of finite energy resources. Knowledge of high school algebra will be sufficient.

The finiteness of fossil fuel reserves is indisputable. Some debatable questions are: 1) How long will they last? 2) Which other energy alternatives should we develop to replace them? 3) What should we do now to anticipate and facilitate the transition to alternative energy sources? 4) What are the major environmental factors associated with our energy choices? We cannot hope to provide all the answers to these and related questions, but we can learn more about the fundamentals of energy and develop a basic understanding of possible options. This knowledge will help us to make choices in a changing world. In the words of Enrico Fermi, a famous physicist, "Ignorance is never better than knowledge."

Optional Assignments:

A book review may be submitted as an extra project. The grade for the book review will be substituted for the lowest exam or quiz grade (whichever will benefit you the most). Acceptable books can be selected from the references found at the end of each chapter. You may choose another book not in these lists if it is approved by me. Feel free to consult me for suggested books on a particular topic. The following books, all published or updated since 2003, might be of interest:

The Party's Over: Oil, War and the Fate of Industrial Societies, by Richard Heinberg.

Hubbert's Peak: The Impending World Oil Shortage, by Kenneth S. Deffeyes.

Out of Gas: The End of the Age of Oil, by David Goodstein,

An Inconvenient Truth, by Al Gore,

Serve God, Save the Planet, by J. Matthew Sleeth.

A term project, if approved, may be substituted for the final examination. The project may be (but is not limited to) a formal paper, an oral presentation or demonstration. An introductory, non-majors, course in physical science necessarily hits the high points of many topics. A term project will allow you to investigate further a topic of your own choosing.

Attendance Policy: Attendance at all class meetings is expected but affects your grade indirectly. There will be material for which you will receive a grade at almost every class meeting. There will be a homework assignment, a short quiz or an in-class exercise to be turned in at most class meetings. The lowest quiz/exercise grade will be dropped. There will be no make ups except for excused absences or unusual circumstances, and then only by **prior arrangement**. Prior arrangement can be as simple as a phone call (my phone is forwarded to my secretary if I am away from my office and, if she is unavailable, to her voice mail). You must be present for examinations (or make **prior** arrangements). The dates for all future homework assignments will be announced in class. These assignments will often be discussed during class and specific information on what an exam will cover may be divulged.

Academic Integrity: Violations of academic integrity and other forms of cheating, as defined in ACU's Academic Integrity Policy, involve the intention to deceive or mislead or misrepresent, and therefore are a form of lying and represent actions contrary to the behavioral norms that flow from the nature of God. Violations will be addressed as described in the Policy. While the university enforces the Policy, the most powerful motive for integrity and truthfulness comes from one's desire to imitate God's nature in our lives. Every member of the faculty, staff and student body is responsible for protecting the integrity of learning, scholarship and research. The full Policy is available for review at the following offices: provost, college deans, dean of campus life, director of student judicial affairs, director of residential life education and academic departments. It can also be found at the following web site:

http://www.acu.edu/campusoffices/studentlife/judicial/For%20Students/Academic_Integrity_P.html

First homework assignment, due Tuesday, 24 January:

Chapter 1, Questions 3, 4, 5, 7, 12, 18, 21, 23 (pp. 30-31).

2 Feb. Chap. 2, Prob. 15, 19, 27, 29, 30, 37, 39, 40, 42, 45

14 Feb. Chap. 3, Prob. 1, 3, 7, 10, 12, 14, 16, 17

21 Feb	Chap. 4, Prob. 6, 14, 20, 22, 30, 32
28 Feb	Chap. 5, Prob. 1, 10, 14, 15
20 Mar	Chap. 6, Prob. 24, 25, 27, 29