RHODES COLLEGE
DEPARTMENT OF PHYSICS

SYLLABUS FOR GEOLOGY 116 – GLOBAL ENVIRONMENTAL CHANGE

Spring Semester, 2008

Professor J. Streete
Office: 215 RT
Phone: 843-3918
Email: jstreete@rhodes.edu

Textbook: "Energy and the Environment – 2nd edition" by R. Ristenen and J. Kraushaar

In this study of global environmental change, we will emphasize the concept of energy. It will be seen that energy obtained from fossil fuels is limited since fossil fuels are not renewable – when they are burned, they're gone. In addition when we burn them the products released are often damaging to the environment. We will look at various measures that may be taken to increase the time span available for use of this type of energy, while making its use less harmful to the environment, and will study the development and implementation of sustainable, alternative energy sources. Along the way there will be separate lectures on such topics as the greenhouse effect and stratospheric ozone depletion.

In the **Course Schedule and Reading Assignments** below, you will notice that the chapters will **not** be covered in order, so be sure to check this schedule regularly. You will find additional readings and material on the WebCT site for this course. The sources may be accessed by clicking on the underlined addresses. Some of this material is required reading or exercises for the course, and all should be helpful as you study the various components of global change.

The class lectures will be held in Barret Library, room 033 on Tuesday and Thursday from 11:00 until 12:15. The computer lab will also be held in this room and will meet Tuesday and Thursday afternoons from 1:00 to 4:00.

The lab periods will last for approximately three hours. One of the goals of the course is learning to use system-modeling software to investigate various physical and social systems. This should enable you to understand better the difficulty of the extremely complex climate models that show what we as human beings can expect to encounter environmentally if we don't quickly initiate real efforts to curb global warming. The modeling will be done on a PC computer with software called Stella II™. You should be able to learn Stella II fairly quickly, but might expect to experience some degree of frustration as you begin using this software. Don't be discouraged!

Although the course is designed to accommodate non-science majors, it does provide Natural Science credit thus mathematics at the level of introductory algebra will be used. You will be required to develop several computer models during the semester. These will be graded and the weight of the grades given your models is shown below.

You will use the web-based courseware, WebCT, to help you learn the course material. Problem assignments for each chapter will be accessible at this website. You are to answer the problems yourself, without help from anyone, but you will have an unlimited number of tries to answer all questions correctly within an announced time period. The questions may be answered on any networked computer to which you have access. Your performance in answering the questions will be graded immediately, and you will be able to see which ones you answered correctly and which incorrectly. The begin and end dates and times for answering these questions are given in a document in my public folder.

Your overall grade for the course will be based on the results of two one-hour tests, your system models, your problem set grades and the **comprehensive** final examination. In determining your final grade, weights will be assigned to each of the course components as follows:

Lower Test Grade - 20%	Models - 10%	
Higher Test Grade - 25%	Problems – 10%	Final Examination - 35%

Since our classroom is a computer lab, you will have a computer at your desk. You will use the computer, obviously, during our lab sessions, but will not during the lectures. In consideration of an important emphasis of the course, that of conserving energy, you will turn your computer off (if it is on) when our lecture begins. If a computer next to you is on, please also turn it off. Turning off the computers will also provide a more comfortable environment for us, as the room can get very warm when all computers are running.

Shown below are a few Websites you will find helpful in your study of Global Environmental Change. Each site has information on one or more topics we will cover in the course, and most have numerous links to other pertinent sites as well. I hope you find this useful.

Global Change Websites

National Renewable Energy Laboratory - http://www.nrel.gov
Environmental Protection Agency - http://www.epa.gov
American Solar Energy Society - http://www.ases.org
Florida Solar Energy Center - http://www.fsec.ucf.edu
Global Energy Marketplace - http://www.crest.org/
The Planets - http://seds.lpl.arizona.edu/nineplanets/nineplanets/overview.html
Energy Information Agency - http://www.eia.doe.gov/
Interstate Renewable Energy Council - http://www.irecusa.org/
Stella II Tutorial - http://www.iseesystems.com/community/downloads/tutorials/stella.aspx
NOAA, Global Warming - http://lwf.ncdc.noaa.gov/oa/climate/globalwarming.html

Course Schedule and Reading Assignments

TUESDAY, 11:00 – 12:15	**TUESDAY LAB, 1:00 – 4:00**	**THURSDAY, 11:00 – 12:15**	**THURSDAY LAB, 1:00 – 4:00**
		Jan. 10 **Introduction to Course** **Chapter 1 – Energy Fundamentals**	
Jan. 15 **Chapter 1 – Energy Fundamentals**	Jan. 15 **Documentary:** **An Inconvenient Truth**	Jan. 17 **Chapter 1 – Energy Fundamentals**	Jan. 17 **Documentary:** **An Inconvenient Truth**
Jan. 22 **Chapter 2 – The Fossil Fuels** **Prof. Carol Ekstrom**	Jan. 22 **Introduction to Stella™ System Modeling Software** **Read: Stella II Instructions** **Model: Electric Light Bulb**	Jan. 24 **Chapter 2 - The Fossil Fuels** **Prof. Carol Ekstrom**	Jan. 24 **Introduction to Stella™ System Modeling Software** **Read: Stella II Instructions** **Model: Electric Light Bulb**
Jan. 29 **Chapter 3 – Heat Engines**	Jan. 29 **Model: Population Growth: an example of exponential increase**	Jan. 31 **Chapter 3 – Heat Engines**	Jan. 31 **Model: Population Growth: an example of exponential increase**
Feb. 5 **Chapter 3 – Heat Engines**	Feb. 5 **Model: Energy Conservation - House A/C with Thermostat**	Feb. 7 **Chapter 4 – Renewable Energy Sources I: Solar Energy**	Feb. 7 **Model: Energy Conservation - House A/C with Thermostat**

Feb. 12 **Chapter 4 – Renewable Energy Sources I: Solar Energy**	Feb. 12 **Measurement of Solar Insolation** **Read:** **"The Earth-Sun System" and the "Solar Insolation Lab" handouts for this lab**	Feb. 14 **Chapter 4 – Renewable Energy Sources I: Solar Energy**	Feb. 14 **Measurement of Solar Insolation** **Read:** **"The Earth-Sun System" and the "Solar Insolation Lab" handouts for this lab**
Feb. 19 **Special Topic: The Greenhouse Effect – Review for Test 1**	Feb. 19 **Field Trip to Memphis Earth Complex**	Feb. 21 **Test 1** **Material Through Tuesday, Feb. 19**	Feb. 21
Feb. 26 **Chapter 5 – Renewable Energy Sources II: Alternatives**	Feb. 26 **Model: Earth, Venus, Mars: Planet temperatures with no atmosphere**	Feb. 28 **Chapter 5 – Renewable Energy Sources II: Alternatives**	Feb. 28 **Model: Earth, Venus, Mars: Planet temperatures with no atmosphere**
March 4 **Spring Break**	March 4 **Spring Break**	March 6 **Spring Break**	March 6 **Spring Break**
March 11 **Chapter 5 – Renewable Energy Sources II: Alternatives**	March 11 **Model: Earth Temperature with Atmosphere**	March 13 **Chapter 7 - Energy Conservation**	March 13 **Model: Earth Temperature with Atmosphere**
March 18 **Chapter 7 - Energy Conservation**	March 18 **Field Trip to Bridges**	March 20 **Easter Break**	March 20 **Easter Break**
March 25 **Chapter 8 (through 8.3) - Transportation**	March 25 **Model: Designing an Energy Efficient House: Use of Realistic R-values.**	March 27 **Chapter 8 (through 8.3) – Transportation Review for Test 2**	March 27 **Model: Designing an Energy Efficient House: Use of Realistic R-values.**

April 1 **Test 2** **Material from Tues., Feb. 26 through Thurs. March 27**	April 1 **Model: Temperature Effect of Increasing Greenhouse Gases**	April 3 **Chapter 9 – Air Pollution**	April 3 **Model: Temperature Effect of Increasing Greenhouse Gases**
April 8 **Chapter 9 – Air Pollution** Special Topic: Ozone Depletion	April 8 **Field Trip to Allen Steam Power Plant**	April 10 **Chapter 10 – Global Effects**	April 10
April 15 **Chapter 10 – Global Effects**	April 15 **Model: The Effect of CO2 Doubling**	April 17 **Chapter 10 – Global Effects**	April 17 **Model: The Effect of CO2 Doubling**
April 22 **Chapter 10 – Global Effects**	April 22 **Christina here??** **Documentary: <u>Who Killed the Electric Car?</u>**	April 24 **Review for Final Exam** **Note: Final exam at 1:00 pm on Monday, April 28.**	April 24 **Documentary: <u>Who Killed the Electric Car?</u>**