

ENS-1001

**THE WHOLE EARTH COURSE**

FALL, 1998

T-R 2:00 – 3:15 p.m.

## Course Outline

Coordinator: Professor George Maul, Director, Division of Marine and Environmental Systems  
Ext. 8096, gmaul@marine.fit.edu

## Other Faculty:

- Dr. Hamid Rassoul, Physics and Space Sciences Department ext. 8778, rassoul@pss.fit.edu
- Dr. Robert Fronk, Department Head, Science Education, ext. 8126, fronk@zach.fit.edu
- Dr. John Windsor, Oceanography & Environmental Sciences Programs, ext. 8096, jwindsor@fit.edu
- Dr. Mike Witiw, Division of Aviation Studies, ext. 7631, witiw@fit.edu
- Dr. Gary Wells, Department Head, Biological Sciences, ext. 8034, gwells@fit.edu
- Dr. Iver Duedall, Oceanography and Environmental Sciences Programs, ext. 8008, duedall@marine.fit.edu

## Teaching Assistant:

Julie Eardley, Science Education, ext. 7211, eardley@fit.edu, office hours: T / R 10 a.m. – 12 p.m.; Link 133

**The Course Description:**

The Whole Earth Course is about the interactions of the components of “the earth system:” the cosmosphere, the geosphere, the hydrosphere, the atmosphere, the biosphere and the anthroposphere. With the advances of modern, sophisticated science and technology it is now becoming possible to begin to quantify these very complex interactions and for the first time develop a holistic view of the earth. This new way of viewing the earth has been called Earth System Science and is profoundly affecting traditional scientific and engineering disciplines.

**The Course Objectives:**

- ◆ To describe the six spheres and the interconnections among them,
- ◆ To provide examples of global change,
- ◆ To develop study habit, discussion skills, and presentation skills,
- ◆ To analyze global changes by developing simple quantitative models,
- ◆ To formulate a new understanding of global change issues according to current scientific data by using team problem solving skills, and
- ◆ To critically evaluate current scientific claims of changes in the Earth system.

**The Course Requirements:**

- ◆ To read assignments before class
- ◆ To access The Whole Earth Internet Site – <http://duedall.fit.edu/wholeearth>
- ◆ To attend computer lab sessions in which student groups will have access to the “Whole Earth” tutorial to be held in the Evans Library Microcenter on Tuesdays and Thursdays, 6-8 p.m.

## OTHER IMPORTANT COURSE INFORMATION:

### Course Grading:

White Papers	60% ***
Format/Spelling/Grammar/References – 25%; Technical Content – 25%	
Participation	10%
Debate 1	10%
Debate 2	10%
Debate 3	10%

\*\*\*Homework is due at class time on the day indicated. Late homework is **not accepted**.

### Participation

Participation includes class attendance, positive contributions to the group discussions, and overall preparedness for class.

All white papers are written by all students in the class. The first white paper will be written and discussed by each student in the class. All students will discuss each subsequent white paper.

### Additional References

- Ahrens, C.D., *Meteorology Today*, West Publishing Co., St. Paul, 1994.
- Bryant, E.A., *Climate Process and Change*, Cambridge University Press, New York, 1997.
- Dyrbye, C. and S.O. Hansen, *Wind Load on Structures*, Wiley, 1997.
- Earth System Science: A Program for Global Change*. NASA Advisory Council, National Aeronautics and Space Administration, Washington DC 20546, 1986.
- Hidore, J.J., *Global Environmental Change*, Prentice-Hall, Upper Saddle River NJ, 1996.
- Houghton, J., *Global Warming*, Cambridge University Press, New York, 1997.
- Levi, B.G., D. Hafemeister, and R.A. Scribner (editors), *Global Warming: Physics and Facts*, American Institute of Physics, New York, 1992.
- Mackenzie, F.T., and J.A. Mackenzie, *Our Changing Planet*, Prentice-Hall, Upper Saddle River NJ, 1995.
- Mullis, K., *Dancing Naked in the Mind Field*, Pantheon, New York, 1998.
- Naeim, F. (editor), *The Seismic Design Handbook*, Van Nostrand Reinhold, 1989.
- Our Changing Planet*, Global Change Research Information Office, 2250 Pierce Road, University Center MI 48710, 1998.
- Singer, S.F., *Hot Talk, Cold Science: Global Warming's Unfinished Debate*, Independent Institute, Oakland CA, 1998.
- Skinner, B.J., and S.C. Porter, *Blue Planet*, Wiley & Sons, New York, 1995.
- Turekian, K.K., *The Global Environmental Change*, Prentice-Hall, Upper Saddle River NJ, 1996.

**Textbook:**

The Blue Planet: An Introduction to Earth System Science, Skinner and Porter (1995)

<b><u>DATE</u></b>	<b><u>SUBJECT</u></b>	<b><u>ASSIGNMENT</u></b>
Sept 1	Introduction, Overview, Requirements (Maul)	pp. vi-19
Sept 3	Meteor Impact as an Example of Earth System Science(Maul/panel)	pp. 207-209
◆		
Sep 8	Exploring the Large Scale Structure of the Solar System. Our Nearest Neighbor; What if? (Rassoul)	p. 20-42 <b>Quiz #1</b>
Sep 10	The Formation of the Solar System. The prevalence of other earthlike planets (Rassoul)	Ch. 1
◆		
Sep 15	Introducing the Solar Neighborhood, and Stellar Evolution (Rassoul)	Ch. 2 <b>Homework due: Cosmos</b>
Sep 17	<b>Earthquakes and Volcanoes:</b> What are they? What do they do? How do we know? What do they tell us about the whole earth? (Fronk)	pp. 68-69 Ch. 3/5 <b>Quiz #2</b>
◆		
Sep 22	<b>Plate Tectonics:</b> Why did we need an idea like plate tectonics? What did it help us explain? Now that we've got it what more has it done for us? (Fronk)	Ch. 6
Sep 24	<b>Change:</b> How do we know the earth has changed? In what ways has it changed? How long is geological time? Can you relate to 4.6 billion years? How can past changes help us understand and predict future changes?	Ch. 7 <b>Homework due: Geos</b>
◆		
Sep 29	Student Group Discussion; Review for Exam 1	
Oct 1	<b>EXAM 1</b>	<b>STUDY!!</b>
◆		
Oct 6	<b>Group Project Status Presentations;</b> Review exam	<b>Project Outline Due</b>
Oct 8	<b>H<sub>2</sub>O:</b> The most interesting and unique chemical compound on planet earth. Who cares? Why is earth the blue planet? (Windsor)	Ch. 8 <b>Quiz #3</b>
◆		
Oct 13	<b>The Ocean:</b> 70.8% of the earth's surface and a major influence on all the other spheres. Global effects of the ocean. The role of the ocean in the production of energy: Tides, OTEC or Oil?(Windsor)	Ch. 9

Oct 15	How much does water change terrestrial surfaces? (Fronk/Windsor/Maul) Where does the water meet the land? Coastlines around the world.	Ch. 10-11 <b>Homework due: Hydros</b>
◆		
Oct 20	The composition and structure of the atmosphere (Witiw)	Ch. 12 <b>Quiz #4</b>
Oct 22	Winds, weather and desert (Witiw)	Ch. 13
◆		
Oct 27	Earth's climate system (Witiw)	Ch. 14 <b>Homework due: Atmos</b>
Oct 29	Student Group Discussion; Review for Exam 2	
◆		
Nov 3	<b>EXAM #2</b>	<b>STUDY!!</b>
Nov 5	<b>Group Project Status Presentations;</b> Review Exam	<b>First Draft of Project Due</b>
◆		
Nov 10	<b>Our Unique Biosphere:</b> Fundamental biological processes to include evolution of an ecosystem, ecological balance and population cycles (Wells)	Ch. 15 <b>Quiz #5</b>
Nov 12	<b>Biodiversity:</b> What is it and is it important? Consideration of global ecosystems, major taxonomic groups and the role of plate tectonics(Wells)	
◆		
Nov 17	<b>The ORIGIN of the Biosphere:</b> Biogeochemical cycles and the origin of life (Wells)	Ch. 16 <b>Homework due: Bios</b>
Nov 19	How many people can the Whole Earth support? Population trends over time vs. non-renewable resources (Duedall)	Ch. 17 <b>Quiz #6</b> <b>WRITTEN TERM PROJECT DUE!!</b>
◆		
Nov 24	Water, Food, and Energy: Three Factors Forcing Man's Impact on the Other "Spheres"(Duedall)	Ch. 18
Nov 26	No class – Thanksgiving Break	
◆		
Dec 1	Looking to the Future: Year 2058 Scenario	<b>Homework due: Anthropos</b>
Dec 3	Student Term Projects Presentation	
◆		
Dec 8	Student Term Projects Presentation	

Dec 10 Student Term Projects Presentation

◆  
Dec 17 FINAL EXAM 3:30 – 5:30 p.m.

**STUDY!!**

**OTHER IMPORTANT COURSE INFORMATION:**

**Course Grading:**

Exam 1	15%
Exam 2	15%
Final exam	20%
Quizzes	10%
Homework	10%
Project	20%
Participation	<u>10%</u>
Total	100%

**Exams**

All exams will be based upon the textbook and lectures, quizzes, computer tutorial, other materials distributed and homework assignments.

**Quizzes**

Quizzes are given throughout the course at the beginning of each module over the required reading assignment for that day. These quizzes will be based on the reading assignment. **Missed quizzes can not be made up!** A missed quiz due to an excused absence will not be counted. All other missed quizzes will be given a zero.

**Homework**

A computer tutorial has been designed for students. Students will be randomly placed into two different groups. Group 1 will complete homework from the computer tutorial during lab sessions; Group 2 will be assigned homework by the professors. After EXAM #1, the groups will switch. Group 2 will complete homework from the computer tutorial while Group 1 will complete homework assigned by the professors. After EXAM #2, both groups can use the computer tutorial as a supplement, however, all students will be assigned homework by the professors. Any quantitative (mathematical) homework assigned by professors is to be completed by all students.

Homework is designed to assist you in learning the subject matter. We return your graded assignments at the first opportunity after your submission. For this reason it is NECESSARY that you submit your homework on time. Homework is due at class time on the day indicated. **Late homework is not accepted.** Each day late results in a 10% decrease in the grade. We encourage you to turn in your homework late. One homework assignment is required for each "sphere" presented during the course. Homework is due at class time on the following dates:

Cosmosphere:	September 15
Geosphere:	September 24
Hydrosphere:	October 15
Atmosphere:	October 27
Biosphere:	November 17
Anthroposphere:	December 1

### **Term Projects**

Term projects will address one of the topics listed below. You are to select a topic area and work with a team of six of your colleagues to show how the six "spheres" interact with your project. More details will be forthcoming. A written and an oral report for the group term project will be required at the end of the semester. Written project outlines and group status report presentations are due on October 6, 1998. Written first drafts of the project and group status report presentations are due November 5, 1998. The final written reports will be due on November 19, 1998. The presentations are scheduled for December 3, 8, and 10, 1998. Dr. Windsor will be responsible for the format for the term projects, both oral and written. Ask him any questions about the format for the project. If you do not select a project topic by September 14, 1998, one will be assigned to you. Each faculty member will serve as a resource for one project. Those projects are listed below:

Plate tectonics	Dr. Fronk
Global warming	Dr. Maul
Ozone hole	Dr. Witiw
Biodiversity	Dr. Wells
Sustainable development	Dr. Duedall
Meteors impacting earth	Dr. Rassoul
Oil spills in the ocean	Dr. Windsor

### **Participation**

Participation includes class and computer lab attendance, participation and positive contributions to group discussion, and overall preparation for class.