

Introduction to Earth System Science - Exploring The Connections

MEA 100 Fall 1998

D. DeMaster: Monday, Wednesday, Friday 9:10-10:00am, Caldwell Hall Room G107

V. Connors: Tuesday, Thursday 9:50-11:05am, Weaver Hall Room 158

Text:

Elemental Geosystems, Second Edition, Christopherson, Prentice Hall, 1998.

Lab Manual:

MEA 100L CoursePak: Introduction to Earth System Science, Fall 1998

References: On reserve in the Natural Resources Library, Jordan Hall

- *Our Changing Planet: An Introduction to Earth System Science and Global Environmental Change*, Mackenzie, Second Edition, Prentice Hall, 1998.
- *Atmospheric Change: An Earth System Perspective*, Graedel and Crutzen, Freeman and Company, 1993.
- *The Nature and Causes of Climate Change: Assessing the Long Term Future*, Goodess, Palutikof, and Davies, Lewis Publishers, 1992.
- *Biogeochemistry: An Analysis of Global Change*, Schlesinger, Academic Press, 1991;
- *The Secret Melody and Man Created the Universe*, Thuan, Oxford University Press, 1995.
- *Earth System Science: A Program for Global Change*, NASA Advisory Council, NASA, Washington, DC 20546, 1986.
- Intergovernmental Panel on Climate Change (IPCC) Technical Papers 1-4 and Summary for Policy Makers, United Nations Framework Convention on Climate Change, 1997.

Internet Resources:

A Gateway to Earth System Science Resources

Prentice Hall's Earth on the Internet: A Field Guide for Geoscience Students

Elemental Geosystems Companion Web Site by Christopherson; go to the chapter you want, click on the "begin" button, and take practice quizzes with immediate scoring from the publisher! Click on to "destinations" and see an organized list of related links.

MEA 100 Course Web Page: Your course web page includes the lecture and lab syllabi, notes, homework assignments, the quizzes, related links to other web sites, and other course information.

Why Earth System Science :

The goal of Earth System Science is to obtain a scientific understanding of the entire Earth system on a global scale by describing how its component parts and their interactions have evolved, how they function, and how they may be expected to continue to evolve on all timescales. The challenge to Earth System Science is to develop the capability to predict those changes that will occur in the next decade to century, both naturally and in response to human activity. (NASA, 1986)

NCSU Earth System Science Education Team

- Dr. Robert Bereman (Chemistry Department)
- Dr. David DeMaster (MEAS Dept) Instructor MEA 100
- Dr. Jerry Watson (MEAS Dept)
- Dr. Skip Stoddard (MEAS Dept)

- Dr. Dan Kamykowski (MEAS Dept) Lab Coordinator
- Dr. Vickie Connors (NASA LaRC; MEAS Dept) Instructor MEA 100
- Dr. Tom Hopkins (MEAS Dept) Instructor MEA 400

Teaching Assistants during Fall 1998

- Brahm Malik (MEA 100-201)
- C. Wynne Bort (MEA 100-202 & 203)
- Jamie Mitchem (MEA 100-204 & 207)
- Hari Warrior (MEA 100-205)
- Sudeep Vaswani (MEA 100-206)
- Jennifer Kehoe (MEA 100-208)

Teaching Assistants during Fall 1997 and Spring 1998

- Neil Jacobs (MEA 100)
- Mitch Smith (MEA 100)
- Chris Petrusak (MEA 100)
- Billy Sweet (MEA 400)

Teaching Assistants and other helpers during Spring-Summer 1997

- Greg Faluvegi
- Anne Marie Queen (TA MEA 100)
- Jen Otter (TA MEA 400)

Course Objectives :

1. Develop a basic understanding of the major components and processes of the four primary Earth systems;
2. Recognize linkages between the Earth systems;
3. Develop an understanding of dynamic equilibrium and feedback loops between and among the Earth systems;
4. Develop an insight for the anthropogenic influences on the Earth systems; and
5. Learn to use computer simulations to model behavior of the Earth systems.

Grading System :

For Dr. Connors' section only: To be eligible for a grade in this section, you must visit me briefly between Aug18-Sep8 for about ten minutes. A sign-up sheet will be posted outside my door for you to make an appointment.

For both MEA 100 Sections:

Attendance and participation in class is a must. Attendance and participation in lab is **MANDATORY!** Make-up labs for excused absences must be arranged ahead of time with the lab instructor, lecture instructor, or TA. ONE makeup lab will be offered during the last week of this semester in your regular lab class time. We expect you to read the lab material **BEFORE** each lab session and to turn in the lab report before you leave each lab session.

This course will be scored on the basis of an accumulation of points throughout the semester. The mandatory lab is worth 25% of the course grade; the lab contributes 150 points. **Attendance is MANDATORY in lab.** The tests and term project will be worth 100 points each. You may prepare a notecard on a 5"x7" index card for each test. During class, pop-quizzes, valued at 5 points each, will be given (these should last only ~2 minutes and will be from your reading assignments); the top ten scores will count towards your grade. You will need to buy 3"x5" index cards for your in-class quizzes. You should expect pop quizzes in your lab class as well. Ten homework assignments (an alternative combination of problems, internet searches, and short papers) will accumulate another 100 points. Homework assignment must be turned in on time; your work will

be considered late after one week past the due date. You will lose a point for each week your work is late. Homework assignments will not be accepted after it is 3 weeks late. Your essay papers should be well-thought out, consisting of an introduction, body, summary paragraphs, and citations. Each should be about 300 words long. You may e-mail the papers to me or you may print them out and turn them in at the beginning of class. ALWAYS keep a copy of your work in case it becomes lost in the ether or mysteriously disappears. Also, always keep a record of all your scores. You may check with me at any time to confirm your accumulation of points.

If you do not have access to a computer, please see me immediately so that we can help you get started. Be sure to come to Jordan Hall and try to log on to any of our computers. Often we need to request access permission for you to use the PAMS workstations. The final **comprehensive** exam is worth 150 points. Extra credit opportunities (up to a maximum potential of 50 points) will be announced in the lecture syllabus throughout the semester.

Test 1	100
Test 2	100
Term Project	100
Homework	100
Pop Quizzes	50
Final Exam	150
Lab	150
Total	750 points

Guaranteed Grading Scale :

A+	(96.7- 100%)	725 - 750 points
A	(93.4- 96.6%)	700 - 724
A-	(90 - 93.3%)	675 - 699
B+	(86.7- 89.9%)	650 - 674
B	(83.4- 86.6%)	625 - 649
B-	(80 - 83.3%)	600 - 624
C+	(76.7- 79.9%)	575 - 599
C	(73.4- 76.6%)	550 - 574
C-	(70 - 73.3%)	525 - 549
D+	(66.7- 69.9%)	500 - 524
D	(63.4- 66.6%)	475 - 499
D-	(60 - 63.3%)	450 - 474
F	(< 60%)	below 450

We reserve the right to adjust the grading scale at the end of the semester. If you have any questions or need to contact us, please feel free to do so. Generally, email works best!!! To send us a quick message, just click on our names below:

● Dr. Vickie Connors: Tue & Thu Lecture

Jordan Hall Room 5151
 Phone: 515-9688 (office)
 233-1727 (home)

Email: vconnors@unity.ncsu.edu

Office Hours: Tuesday, Wednesday, and Thursday from 1-4 pm or by appointment.

- Dr. Dave DeMaster: Mon, Wed, Fri Lecture

Jordan Hall Room 4132
Phone: 515-7026 (office)
Email: dave_demaster@ncsu.edu
Office Hours: TBA

- Dr. Dan Kamykowski : Lab Coordinator

Jordan Hall Room 4156
Phone: 515-7894 (office)
Email: dan_kamykowski@ncsu.edu
Office Hours: TBA

Photo Credits



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Note: This schedule may change, so keep checking in.



Introduction to Earth System Science Lecture Syllabus

Fall 1998

Week of	Lecture Topics
Aug 17-21	<u>Introduction to Earth System Science</u> , Powers of Ten Video <u>The Earth and Its Solar System</u>
Aug 24-28	<u>Models of the Universe (The First 3000 Years)</u> <u>Models of the Universe (1300 AD to present)</u>
Aug 31-Sep 4	<u>Introduction to the Geosphere</u> , The Rock Cycle Video <u>Plate Tectonics</u>
Sep 7-11	The Rock Cycle: <u>Minerals and Rocks</u> The Rock Cycle: <u>Soils and Climate</u>
Sep 14-18	<i>Paleo-Biosphere - Life in the Rocks</i> , Dr. Reese Barrick, NCSU <u>Review for Test 1: The Solar System and the Solid Earth</u>
Sep 21-22	<u>Test 1: The Solar System and the Solid Earth</u>
Sep 23-25	<u>Introduction to the Hydrosphere</u> <u>Human-induced Changes to Hydrosphere</u>
Sep 25	<u>Viewing the Night Sky</u>
Sep 28-Oct 2	<u>Oceans: Composition and Circulation</u> <i>Minor Reservoirs: Surface and Ground Water</i> , Dr. Dave Evans, NCSU

Oct 5-9	<u>The Cryosphere</u> <u>Coastal Zone</u>
Oct 12-16	Fall Break <u>Biogeochemical Cycles</u> <u>Introduction to Term Project</u>
Oct 19-23	<u>Introduction to Atmosphere</u> <u>Radiation Balance</u> <u>Weather and Climate</u>
Oct 26-30	<i><u>Tropospheric Ozone and Photochemical Smog</u></i> <i><u>Stratospheric Ozone</u></i> Dr. Bruce Doddridge, University of Maryland
Nov 2-6	<u>Air-Sea Interactions: El Nino</u> <u>Global Climate and Climate Change</u> <u>Team Presentations: Resources, Health, Education, Industry,</u> <u>Technology, Environmental Conservation, Political Climate</u> (Example of <u>Country Team Report</u>)
Nov 9-13	Review for <u>Test2: The Hydrosphere and the Atmosphere</u> Test 2: The Hydrosphere and the Atmosphere Complete Team Presentations
Nov 14	<u>International Treaty Negotiation</u> , Biltmore Hall Rm 2010 Session I- 9:00am-12:00pm Session II- 1:00-4:00pm
Nov 16-20	<u>Introduction to Biosphere</u> <u>The Trophic Pyramid, Terrestrial and Aquatic Ecosystems</u> <u>Human Ecosystems and Emerging Infectious Diseases</u>
Nov 23-27	<u>Natural Resources and Forests Ecosystems</u> Thanksgiving Holiday
Nov 30-Dec 4	<u>Risk Perception and Assessment</u> , Notes from Dr. Joe Herkert, NCSU Recommended Reading: <u>Risk Principles</u> <u>Review</u> for Comprehensive Final Exam
Dec 7 9:00-12:00pm	Comprehensive Final Exam Section 001 CAL G107