

# Global Environmental Assessment

## ENSC 130

Spring, 2008

Dr. Leslie A. Morrissey

Location: [Rowell room 118 for lecture and Aiken Center room 222 \(lab\)](#)

Time: 2:00 – 3:15 pm Tuesday and Thursday, Wednesday lab 1:30\* - 4:00 pm

### Course Description

Human impacts on the global environment have led to some of the most significant and pressing scientific and policy issues of our times. An in-depth assessment of key environmental topics will be made using a case study approach supported by hands-on computer analyses with geographic information systems (GIS) and remote sensing tools applicable to these issues. A major focus will address mechanisms, causes, and consequences of global climate change. This survey-level course will introduce students to recent scientific discoveries and developments, state-of-the-art technologies, an interdisciplinary perspective, and the problem-solving skills necessary to assess and evaluate scientific data and findings.

Our scientific understanding of the Earth is rapidly expanding due to technological developments. Satellite remote sensing provides a tremendous capability to monitor resources and changes on the earth's surface due to natural phenomena and human disturbance. GIS provides the tools for integrating and analyzing large amounts of information within a spatial context. Awareness of critical environmental issues and the technological tools that fuel scientific discovery and invention will be addressed in this course. Lectures will be augmented with hands-on labs using state-of-the-art GIS software and problem-solving activities. The goals for the course follow:

- Understand and assess global and regional changes related to climate change.
- Familiarize students with the capabilities of satellite-based remote sensing, GPS, and Geographic Information Systems (GIS) technologies.
- Evaluate the scientific evidence surrounding key environmental issues.

Course web sites: Homework assignments, labs, readings, and lecture materials are available on the course web site at [www.uvm.edu/envnr/ensc130](http://www.uvm.edu/envnr/ensc130)

You can check your grades throughout the semester on WebCT ([www.uvm.edu/webct](http://www.uvm.edu/webct)).

Readings: No formal textbook is used in this course, however, the instructor will provide select readings that are available on the course web site.

### Grading

Midterm exam (100 pts.)	25%
Lab exercises (8 at 10 pts. each)	20%
Homework assignments (10 at 10 pts. each)	25%
Final examination (100 pts.)	25%
Class Participation (20 pts.)	5%

Exams will be objective and will consist of multiple choice, true-false, and short answer type questions. Final grade will be awarded on the basis of standing within the class as determined by exams, assignments, class participation, and lab scores, cumulative for the semester (90% = A-, 80% = B-, 70% = C-, etc.). **Late assignments or labs will be downgraded 10% per week.** Class participation will count towards 5% of your grade and is based on: attendance, arriving on time, not leaving the room during lecture, staying awake, being prepared, participating in discussions, etc. ***You will be penalized by 5 points (each time) for (unexcused) tardiness to class.*** *Homework assignments are handed out and due on the first class day of the week, one week following their listing in the syllabus. Lab assignments are due on the second class day of the week, one week following the lab period.*

### Computer-Aided Laboratory Exercises and Homework Assignments

Each student will complete 8 labs. Students will be introduced to satellite remote sensing, Geographic Information Systems (GIS), and GPS technologies. Laboratory exercises and homework assignments will emphasize use of “active learning” approaches; many of the resources required to complete the lab and homework assignments are or will be made available on the Internet. The key code to access room 222 will be provided the first day of class.

Students will be required to develop basic computer skills in searching for information on the WWW, downloading, handling, and analyzing environmental data. Each student will be required to have a computer account on Zoo.

Office Hours: T 3:30-5:00, W 12-1 and by appointment

Instructor: Leslie A. Morrissey  
Aiken Center, room 325  
Leslie.Morrissey@uvm.edu (best way to get my attention)

TA: [Keith Pelletier](#) [Agata Czerminska](#)  
[Keith.Pelletier@uvm.edu](#) [Agata.Czerminska@uvm.edu](#)

## SYLLABUS

**Jan. 15/17**

TUES – Welcome, Course overview

Human Dimensions of Global Change

THURS - The Ecological Crisis of the 21st Century - Human Population

*Reading: Sierra Club Population Ballot*

**Jan. 22/24**

TUES – Immigration

Detecting Global Environmental Change (Geospatial Technologies)

THURS - Introduction to Geographic Information Systems (GIS)

**HW Assignment #1 - Population Trends and Natural Resource Use (due in one week)**

**LAB 1: INTRODUCTION TO ARCGIS (section A 1:00\* – 2:30, B 2:30-4:00)**

*Reading: Skin Deep, Getting Started with ArcGIS and read over Lab 1*

**Jan. 29/31**

TUES - *World in a Box*

THURS – Remote Sensing of the Environment

**HW Assignment #2- GIS Overlay Analysis (due in one week)**

**LAB 2: TERRAIN ANALYSIS WITH ARCGIS (section A 1:00\* – 2:30, B 2:30-4:00)**

*Reading: Environmental GIS*

**Feb. 5/7**

TUES - *Eyes in the Sky*

THURS - Air Photointerpretation

**LAB 3: REMOTE SENSING SAMPLER**

**HW Assignment #3- Unit Conversions (due in one week)**

*Reading: Heat islands and green roofs, Scientists Wanted*

**Feb. 12/14**

Human Impacts on Natural Resources

TUES – Recreational Water Quality

THURS - Impacts of Urbanization on Streams

**HW Assignment #4 – Employment Search (due in one week)**

**LAB X: BAILEY HOWE LIBRARY MAP ROOM (basement of library)**

*Reading: Arsenic Crisis in Bangladesh, Waterborne Pathogens in Agricultural Watersheds (pgs 22-42)*

**Feb. 19/21**

TUES – Statistics Primer

THURS – Urban Watershed Protection

**HW Assignment #5 – Understanding Statistics (due in one week)**

**LAB 4: IMPERVIOUS MAPPING – A COMPARISON OF SAMPLING DESIGNS**

*Reading: Ecosystem Services, Impervious Surfaces*

**Feb. 26/28**

TUES – Landscape Ecology

THURS – **Review for Midterm Exam**

**LAB 5 – LANDSCAPE ANALYSIS (FRAGMENTATION)**

**HW Assignment # 6- Write an Abstract (due in one week)**

*Readings: Biodiversity Hotspots for Conservation, Conserving Biodiversity Coldspots*

**Mar. 4/6**

TUES – *No Class...Town Meeting Day*

THURS – **Midterm exam**

**Lab: no lab this week**

*Spring Recess (March 10-14)*

**March 18/20**

TUES – Endocrine Disrupting Chemicals (and review exam)

**Global Climate Change - Evolution of the Atmosphere and Life on Earth**

THURS – Evolution of the Atmosphere

**HW Assignment # 7- Seminar Critique (due in two weeks)**

**Reading: *Human Biomonitoring of Environmental Chemicals, Poisoning our Children***

**Lab: no lab this week (read the lab material for next week)**

**Mar. 25/27**

TUES - Introduction to Global Positioning Systems (GPS)

THURS - Past Climatic Changes

**Reading: *The Day the World Burned (i.e. Past Extinctions, Retooling GPS)***

**Lab 6: GPS NAVIGATION (meet in rm 222 - dress appropriately) LAST NAME A – L**

**Apr. 1/3**

TUES – Worldwide Distribution of Carbon Dioxide

THURS – A Changing Climate

**LAB 6 - GPS NAVIGATION (meet in rm 222 - dress appropriately) LAST NAME M - Z**

**HW Assignment # 8- Carbon Cycling in Trees and Autos (due in one week)**

**Readings: *The Coming Climate, Modeling Global Climate Change***

**Apr. 8/10**

Impacts on the Atmosphere

TUES – *Civilization and Climate (James Burke)*

THURS – Guest seminar

**HW Assignment #9 - Carbon Dioxide Emissions (due in one week)**

**Readings: *Briefing 15 – The Dyson Effect: Carbon “Offset” Forestry, Carbon Offsets***

**Lab 7: REMOTE SENSING LAB AT SPEAR AND SWIFT (dress appropriately)**

**Apr. 15/17**

TUES – Impacts of Global Climate Change

THURS – *Global Dimming*

**HW Assignment #10 – Value of Ecosystem Services (due in one week)**

**Lab: no lab this week**

**Readings: *How will climate change effect human health? Ecology of Lyme disease, Secret History of Lead***

*April 22 is Earth Day!*

**Apr. 22/24**

TUES – *The Apocalypse and Al Gore*

THURS – Solutions for the Future, assessment

**LAB 8: NRG FIELD TRIP (SUSTAINABLE BUILDING DESIGN)**

**Reading: *Little Green Molecules, Can this man save the world?, Light at the end of the tunnel***

**April 29**

TUES – Review for final

**Final Exam – Thursday May 8<sup>th</sup> at 3:30 p.m.**

**READING LIST**  
(CHECK THE ENSC 130 WEB SITE FOR UPDATES)

Jablonski, N, G. and G. Chaplin, 2002, Skin Deep, *Scientific American*, October, 2002, pages 75-81.

Reichhardt, T.,1996, Environmental GIS, *Environmental Science and Technology*, American Chemical Society, 4 pages.

Rosenzweig, C., W. Solecky, L. Parshall, S. Gaffin, B. Lynn, R. Goldberg, J. Cox, and S. Hedges, 2006, Mitigating New York City's Heat Island, *86<sup>th</sup> American Meteorology Society Annual Meeting*, Atlanta GA, January 28 – February 3, 2006, 5 pages.

Rosen, B., 2000, Waterborne Pathogens in Agricultural Watersheds, Watershed Science Institute, Natural Resources Conservation Service, U.S. Department of Agriculture, Special Report, 64 pages. Go to <http://www.wsi.nrcs.usda.gov/products/nutrient.html>

Chowdhury, A. M., Arsenic Crisis in Bandladesh, *Scientific American*, August 2004, pgs. 87-91.

Kareiva, P. and M. Marvier, 2003, Conserving Biodiversity Coldspots, *American Scientist*, vol. 91. pg 344-351.

Friends of the Earth, Poisoning our Children: The danger of exposure to untested toxic chemicals, *Friends of the Earth*, 12 pages.

Sexton, K. L. Needham, and J. Perkle, 2004, Human Biomonitoring of Environmental Chemicals, *American Scientist*, 92:38-45.

Daily, G. C., S Alexander, P. R. Ehrlich, L. Goulder, J. Lubchenco, P. A. Matson, H. A. Mooney, S. Postel, S. H. Schneider, D. Tilman, and G. M. Woodwell, 1997, Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems, *Issues in Ecology*, No. 2, 16 pgs.

Kring, D. and D. Durda, 2003, The Day the World Burned, *Scientific American*, 99-105.

Enge, P., 2004, Retooling GPS, *Scientific American*, 5:90-97.

Newton, S., 1999, Briefing 15 – The Dyson Effect: Carbon “Offset” Forestry and the Privatization of the Atmosphere, Corner House Briefing No. 15, The Corner House, [www.thecornerhouse.org.uk/briefing/15pr.html](http://www.thecornerhouse.org.uk/briefing/15pr.html)

Martens, P., 1999, How will climate change effect human health?, *American Scientist*, vol. 87, pages 534-541.

Gardner, G., 1998, Recycling Human Waste: Fertile Ground or Toxic Legacy, *World Watch*, pages 28-34.

Ostfeld, Richard, The Ecology of Lyme-Disease Risk, *American Scientist*, pgs 338-346, 1997. <http://www.americanscientist.org/template/AssetDetail/assetid/30658/>

Collins, T. and C. Walter, Little Green Molecules, *Scientific American*, pgs. 82-90, 2006

Campbell, P., 2007, Light at the end of the tunnel, *Nature*, 445:567.