January 20, 2005

ENVIRONMENTAL SCIENCE & GEOGRAPHY
Course Description

1. TITLE OF COURSE AND COURSE NUMBER: Environmental Pollution, Hazards, Impact and Risk – ENV-423

2. DESCRIPTION OF THE COURSE: An introduction to state of knowledge of environmental pollutants and hazards. Air, water and soil pollutants will be summarized along with their toxicological impact. The methodology of impact assessment will be presented through the formal of case studies. Techniques for the assessment and computation of risk will be discussed and the students will be asked to perform some simple case study problem sets.

3. COURSE PREREQUISITES: ENV-110 & 115, Chemistry 160/1 or 163/4

4. COURSE OBJECTIVES:

1. To review the major sources of environmental pollution and hazards.
2. To understand the quantitative impact of pollutants on human and ecological health.
3. To learn how to quantify risk in terms of the source, fate and transport of pollutants and in terms of the risks associated with environmental hazards.

5. STUDENT LEARNING OUTCOMES:
Upon completion of this course students should be able to:

1. Effectively express themselves in written and oral form through the oral presentation of case studies on pollutants, hazards, impact and risk assessment case studies.
2. Demonstrate the ability to think critically through the assessment of case studies as presented during exams.
3. Locate and use information on pollution and hazards and integrate that knowledge and information into an original risk assessment.
4. Work effectively with others as a team in the preparation of an original, quantitative risk assessment as the focal point of a term assignment.
5. Recognize the major types and sources of environmental pollutants and hazards.
6. Understand what information is necessary to quantify the risks associated with those pollutants and hazards.
7. Understand the procedures used in performing an assessment for human and ecological health risks.

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6. TOPICAL OUTLINE OF THE COURSE CONTENT:

Lecture Outline:

Introduction
- Toxins & Hazards
- Dose Response
- Review of applicable statistics as applied to risk assessment
- Threats to Human Health - overview
- Threats to Ecological Health - overview

Outdoor Air Pollution
- Types
- Regulatory Framework
- Case Studies

Indoor Air Pollution
- Types
- Regulatory Framework
- Case Studies

Water Pollution
- Types
- Regulatory Framework
- Case Studies

Hazards
- Types
- Regulatory Framework
- Case Studies

Impact Analysis
- Structure and Approach – International Comparisons
- Format
- Case Studies

Risk Analysis
- Exposure Assessment
  - Source, Transport & Fate
- Modeling
- Risk Synthesis

Lab Outline: none

7. GUIDELINES/SUGGESTIONS FOR TEACHING METHODS AND STUDENT LEARNING ACTIVITIES:

Case studies and recreation of actual risk assessments using simplified criteria and models.

8. GUIDELINES/SUGGESTIONS FOR METHODS OF STUDENT ASSESSMENT (STUDENT LEARNING OUTCOMES):

1. Graded oral presentations on state of knowledge of specific pollutants or hazards.
2. Graded written report on modeling reconstruction of case study.
3. Class participation.

9. SUGGESTED READINGS, TEXTS, OBJECTS OF STUDY:

Shaw, I.C., and John Chadwick, 1998, *Principles of Environmental Toxicology*, Taylor and Francis, London, UK.

Articles from *Risk Analysis: An International Journal* and others would be assigned for reading.

In addition resources at the following two web sites (and others like it) would be assigned during the semester:

National Center for Environmental Assessment - USEPA
www.epa.gov/ncea/
Risk Assessment Information System - ORNL
risk.lsd.ornl.gov/rap_hp.shtml

10. BIBLIOGRAPHY OF SUPPORTIVE TEXTS AND OTHER MATERIALS:

Aldridge, W.N., 1996, *Mechanisms and Concepts in Toxicology*, Taylor and Francis, London, UK.

Bockris, J.O'M, ed., 1977, *Environmental Chemistry*, Plenum Press, New York.

Byrd, Daniel M., III, and Cothern, Richard, 2000, *Introduction to Risk Analysis: A systematic Approach to Science-based Decision Making*.

Cremlyn, R., 1978, *Pesticides - Preparation and Mode of Action*, John Wiley and Sons, Ltd..

Gilpin, A., 2000, *Environmental Impact Assessment: Cutting Edge for the Twenty-First Century*, Cambridge University Press, UK.

Guthrie, P.E., and J.J. Perry, eds., 1980, *Introduction to Environmental Toxicology*, Elsevier

North Holland, Inc., New York.

Loomis, Lea, and Fibiger, T.A., *Essentials of Toxicology*, Philadelphia, PA.

McIntyre, A.D., and C.F. Mills, eds., 1975, *Ecological Toxicology Research,* Plenum Press, New York and London.

Paleologos, Evan K., and Lerchie, Ian, 2002, *Environmental Risk Analysis*.

11. PREPARER=S NAME AND DATE:

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    May 27, 2003

12. ORIGINAL DEPARTMENTAL APPROVAL DATE: June 2003

13. REVISER=S NAME AND DATE: R. Pardi, December 2004

14. DEPARTMENTAL REVISION APPROVAL DATE: December 2004