

Thomas B. Wilson, Lecturer
University of Arizona
Department of Soil, Water, and Environmental Science
Room 308, Family and Consumer Sciences Building
University of Arizona
Tucson, AZ 85721
520-621-9308, Fax 520-621-1647
E-mail: twilson@Ag.Arizona.edu

Introduction to Environmental Science – A case study of critical thinking strategies and the development of technical writing skills

Introduction to Environmental Science:

**A Case Study Of Critical
Thinking Strategies And The Development
Of Technical Writing Skills.**

**Dr. Tom Wilson
Department of Soil, Water and Environmental Science
University of Arizona
Tucson, AZ**



Overview

Introduction to Environmental Science (NATS 101)

- University general education course
- 200 – 300 students (mainly freshmen)
- Human interactions with natural systems
- Lecture component: 1 hour, 2 x week
- Lab component, 2 hours, 1 x week
- Web-based course materials (no textbook):
 - ★ <http://www.gened.arizona.edu/es03S/>



Student background:

- Undecided or non-science major
- Lower division (usually new to University)
- Little or no laboratory experience



Assignments:

- ★ **Exercises** during lectures help students to develop critical thinking strategies
- ★ **Lab reports** assigned during lab activities enable students to develop technical writing skills.



Lectures

Five Sections:

1. [The Planet Earth](#)
2. [The Nature of Life on Earth](#)
3. [Local Environmental Issues](#)
4. [Impact of Resource Use](#)
5. [Your Role in Managing the Earth](#)



- ★ During the semester, lectures focus on:
 - background information
 - contemporary environmental topics
 - how to establish relevance between students' life and environmental concerns



Each lecture period consists of 25 minute mini-lectures, each followed by a multiple-choice concept test, e.g.:

- ★ The demise of the dinosaurs
 - A. was followed by new speciation
 - B. also killed off all mammal species
 - C. occurred as a result of background extinction
 - D. occurred when a Mars- sized object hit Earth



Exercises include:

– Critical evaluation of selected websites:

- ★ <http://www.geoffmetcalf.com/bread.html>
- ★ <http://www.dhmo.org/>
- ★ <http://www.genochoice.com/>
- ★ <http://home.inreach.com/kumbach/velcro.html>





★ Exams include:

- Multiple choice, short answer, and essay questions to accommodate different learning styles
- An all-essay option

★ Example essay question:

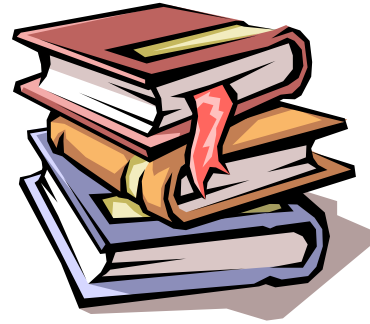
- What is natural selection? Why is it not just “survival of the fittest”?

Lab Activities

- ★ Activities allow students to have a “hands on” exposure to the concepts presented during lecture.
- ★ Examples:
 - Introduction to the Library
 - Water Quality
 - Soils in the Environment



Lab Activities: An Example



Introduction to the Library

★ Students:

- learn how to find published information
- learn how to cite published information
- learn about plagiarism
- write an appropriately-cited summary of two published works about the same topic



Water Quality Lab: Another Example

Students:

- match water samples with six possible sources, by testing pH, EC, nitrate, and coliform bacteria
- identify each sample with its' source, based on background information about each test
- justify their conclusions based on their experimental results and background information





This lab exercise enables students to make the connection between science, their lifestyle, and local environmental topics.



In each lab activity:

- students work together in teams to conduct an experiment
- this information is subsequently presented in an individual lab report
- each lab report follows the format of a research manuscript



Lab reports contain:

- **Title Page**
- **Abstract**
- **Introduction**
- **Materials and Methods**
- **Results**
- **Conclusions**
- **References**





★ **By following a consistent format,**

- students develop technical writing skills and the ability to conduct research.

★ **By working in teams,**

- students develop the ability to share information and lab responsibilities

A synthesis of lecture and lab activities allows students to:

- become active participants in the scientific process
- increase their awareness of environmental concepts
- develop research tactics and strategies
- identify relevant (and accurate) information
- improve their communication skills



Questions

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