

BIOL 1340 DL
Fall 2012
SYLLABUS: Page II

A. Goals of Course

- 1. To convey the idea that the universe is understandable to human beings through our senses without recourse to supernatural entities and that it obeys physical laws.**
- 2. To present science as "one of the grand adventures of exploration characterized by odysseys of pure thought which are often inspired by empirical information."**
- 3. To foster an appreciation for the aesthetic qualities of science and an awareness of the moral and ethical issues that stem from science.**
- 4. To expose students to the different ways scientists communicate their ideas and research to other scientists and the community at large.**

In order to achieve these goals, students will master that following objectives through examples from the physical and life sciences:

- 1. Students will learn the difference between an explanation and a hypothesis supported by controlled experiments.**
- 2. Students will learn that most theories are impermanent.**
- 3. Students will demonstrate that the precision of all physical measurement is limited.**
- 4. Students will learn that mathematics allows one to abstract generalities and deal with general relations.**
- 5. Students will demonstrate knowledge of basic statistics and probability and how they apply to the provisional nature of science.**

6. Students will demonstrate knowledge of an experimental and a historical approach to supporting a hypothesis.
7. Students will examine a number of important discoveries in various scientific disciplines in the original literature in order to understand the limits and ramifications of science.

B. Textbooks (Available at UT Bookstore or any on-line vendor)

- **Allen, G. E., and J. J. W. Baker, (2001) *Biology: Scientific Process and Social Issues*. Fitzgerald Science Press. (A/B)**
- **Lee, J. A., (2000) *The Scientific Endeavor: A Primer on Scientific Principles and Practice*. (L)**

C. Assessment of Students

Several mechanisms will be used to assess how well students are meeting the objectives and goals of the course: weekly exercises, assignments, and discussion board postings, a science journal, and assigned projects.

D. List of Topics

Session 1

- I. What is science?
- II. What are "facts"?
- III. Logical reasoning and probable inference.

Session 2

- I. Reasoning in science: Snow on cholera.
- II. Epidemiology in the 1990's.
- III. Koch's postulates.

Session 3

- I. The use of mathematics in science.
- II. Probability.

Session 4

- I. Insight and creativity in science: Where do hypotheses come from?**
- II. What is a hypothesis?**
- III. Is heat a substance?**

Session 5

- I. Prediction and measurement.**
- II. Data presentation: Interpreting graphs and sketches.**

Session 6

- I. What makes a good experiment?**
- II. Historical science.**

Session 6

- I. Science, scientists, and society.**
- II. The culture of science.**
- III. Ethics in science.**
- IV. Bias in Science**
- V. The Social Context of Science.**
- VI. Science and pseudoscience: how to tell the difference.**
- VII. Myths and Misconceptions.**
- VIII. Communication in Science.**