

Syllabus for

SCIENCE, SOCIETY & GLOBAL CATASTROPHES

ZOO291, GEO297, PHY291 (3 credits)

Fall 2000

This is a team-taught, interdisciplinary course. It focuses on the nature, excitement, and role of scientific inquiry as a means of solving real-world problems through research and collaboration. By using the fundamental unifying principles of the natural sciences, it puts in scientific context important public issues such as past and possible future catastrophes that did and can affect our environment (e.g., plagues, extinctions, global warming, ozone depletion, nuclear winter, collisions with space debris, etc.). The historical, scientific, and social aspects of each theme will be examined from different perspectives, and solutions will be proposed and analyzed. The course emphasizes the different approaches to scientific knowledge and the importance of being an informed user of this knowledge as a responsible citizen.

Format Two lectures per week TR 3:00pm – 4:15pm (Rm. 220 at UWMC)

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Office Hours are given at the course's web site.

Text There is no text for this class. Instead, we will use handouts for all topics covered.

Goals

- 1) To understand how science is structured and develops, and to study the historical development of scientific ideas through the use of contemporary problems.
- 2) To learn how to distinguish between science and pseudo-science.
- 3) To illustrate the value and cost of the scientific enterprise and to promote rational examination of the appropriate public policy choices.
- 4) To examine how scientific knowledge and risk assessment can interest and impact public policy making.

References

Consult the course's web site for specific references:

<http://www.uwmc.uwc.edu/is/GlobalCathome.htm>

In addition, journals of particular relevance include *The Economist*, *Physics Today*, *Science News*, and *Scientific American*. *Nature* and *Science* are highly technical journals but include sections covering news and commentary on current matters.

Proficiencies

We will address the following proficiencies in this course.

I. Clear and Logical Thinking

- (a) Analyze, synthesize, evaluate and interpret information and ideas.
- (b) Construct and support hypotheses and arguments.
- (c) Distinguish knowledge, values, beliefs, and opinions.
- (d) Select and apply scientific and other appropriate methodologies.
- (e) Solve quantitative and mathematical problems.
- (f) Interpret graphs, tables, and diagrams.
- (g) Integrate knowledge and experience to arrive at creative solutions.
- (h) Evaluate situations of social responsibility.
- (i) Make decisions based on an informed understanding of the moral and ethical issues involved.

II. Effective Communication

- (a) Read and listen with comprehension and critical perception.
- (b) Recognize fallacies and inconsistencies.
- (c) Respond to the media actively and analytically.
- (d) Write clearly, precisely, and in a well-organized manner.
- (e) Develop a large and varied vocabulary.
- (f) Respond orally to questions and challenges.
- (g) Work collaboratively as part of a team.
- (h) Gather information from printed sources, electronic sources, and observation.
- (i) Use computer technologies for communication and problem solving.

III. Aesthetic Response

- (a) Employ and expand the imagination.

Grade

Assignments 90% (on the average once a week)
Class Participation 10%

Assignments

Assignments will be given on the average once a week. An assignment may include essay questions (especially on the interplay of science and politics), short-answer questions, multiple-choice questions, or questions which will require some mathematical manipulations. We strongly encourage that you work together in groups. The kind of learning that occurs during group discussions is very important and should not be underestimated. However, even when an idea has been discussed and agreed on by everyone in a group, you should use your own words to write it down in your exam. Do not copy someone else's wording. **Plagiarism** is not only against school policy but also unethical and **will not be tolerated**.

Homework

Readings. Preparation for in-class discussions.

Rules

- Constant attendance is assumed.
- Announcements may not be repeated, so that faithful attendees will not be subjected to repetitious definition of terms and announcements.
- Every paper you send to us **must** include your name and campus. No credit will be given to a paper that does not have this information.
- A paper received after we return graded papers for an assignment **will** not be accepted.
- If you send us a paper by e-mail, **it must be done as a Microsoft Word attachment using your student e-mail account**. If necessary, contact your local DE support person for information on how to do this using your home account. **A copy of your e-mail must be sent to your local DE support person.**
- If you miss one or more classes you must contact your local DE support person as soon as possible to obtain copies of the lecture tapes.
- There will be **no** “curving” of grades. Minimum passing grade is 60%.
- Grading scale: D-: [60, 63); D: [63, 67]; D+: (67, 70); C-: [70, 73); C: [73, 77]; C+: (77, 80); B-: [80, 83); B: [83, 87]; B+: (87, 90); A-: [90, 93); A: [93, 100].

General Advice

The lectures will be more useful if you are current in the reading assignments. We may omit or briefly cover some topics (not because they are without merit) to avoid spreading ourselves too thin. If the class so desires we may cover some topics in more detail. Reading assignments will be given for each lecture.

What is expected from you? Study the figures and illustrations of scientific principles and results. Are they based on experiments or conjecture? Is there a term you cannot define? If you skip class and are behind in the reading you may not be able to follow the lectures with so many new terms you don't recognize. If you are current and we are running off without explaining a term, please challenge us to explain ourselves.

As you read ask yourself “How is this known?” Nature is the true authority, **not** the text or handouts! Is the fact deduced from experiments, from observations, or merely definition? Laws, Theories, Models, Hypotheses, and Scenarios are all generalizations from nature of descending certainty, which may be inconsistent with later discoveries. We hope to tell you how nature “works” and how we come to know it.

The set of references at the end of each handout provide access to other treatments of the subject which may help you understand the concepts better.

If this is your first science class, or if you are uncertain on how to read a science text, read carefully the handout “On Mathematics and how to Read a Science Textbook.” If you still have questions, come and see us.

It is obvious that each student has different ideas as to what constitutes a good class and a good instructor. It should also be obvious that we will not know if there is a problem in the class unless you tell us so. If you have any suggestions for making the class better, or if you have a problem with the way we present things, use the “evaluation” form handed out **at any time** during the semester. Do not wait until it is too late to “fix” whatever the problem may be. We cannot read what you are thinking. You are as much responsible for what you are learning as we are. Be active in class, learn how to defend your opinions, learn how to accept someone else's if they are right, express your concerns, make constructive suggestions, learn, and learn how to learn. Do not worry about grades, yours or anybody else's. You should try and do the best you can compared to the standards we set for this class. The degree to which you meet them will correspond to your grade.

ZOO291, GEO297, PHY291 — Tentative Schedule (9/5/00)

Week	Date	Topic
1	T Sept. 5	Definitions of “catastrophe,” “science,” and “scientific method.” Discussion.
	R 7	
2	T 12	
	R 14	
3	T 19	Plagues: Introduction to Diseases – Case Studies and Policy Issues.
	R 21	
4	T 26	
	R 28	
5	T Oct. 3	Discussion.
	R 5	
6	T 10	Ozone Depletion.
	R 12	
7	T 17	Energy Balance, Global Warming. (Time permitting, we might also discuss World Population.)
	R 19	
8	T 24	Policy Issues.
	R 26	
9	T 31	Discussion.
	R Nov. 2	
10	T 7	Cosmic Collisions.
	R 9	
11	T 14	<i>Thanksgiving Break</i>
	R 16	
12	T 21	Cosmic Collisions.
	R 23	
13	T 28	Policy Options, Costs, and Political Considerations.
	R 30	
14	T Dec. 5	Discussion.
	R 7	
15	T 12	Science and Society. Discussion.
	R 14	

Final: Thursday, December 21, 1–3pm.