Freshman Seminar

Course Title: **Junk Science and Public Policy**
Standing athwart knowledge, yelling "Stop!!!!"

Instructor: John Herrington, Department of Chemistry
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Class Meeting: 48 minutes, one day per week
Office Hours: ?

Most of us would agree that science is a good thing; it has improved and extended our lives and it has allowed us to explore the heavens and the Earth below us. It has also fundamentally changed the way we perceive the universe and each other. But is the pursuit of science always good? Have scientists become the new High Priests of our altered society?
This course is designed to give you the tools to see through the fraud, deception, and slight-of-hand that pervades the reporting of science. In other words, how and why does the media distort the facts and, thus, the reality of the situation?
But it's not just the reporting of science that can be a problem, it is also the nature of both science and scientists that can influence and distort the information you receive about this fundamental aspect of knowledge.
In other words, in this day and age, it may be in your best interest to become a skeptic.

Prerequisites: None. Some science background may be helpful for understanding some of the more technical issues. An appetite for reading newspapers and magazines will also be helpful.

Required Text: *The Skeptical Environmentalist: Measuring the Real State of the World* by Bjorn Lomborg
There will also be selected readings from other sources as well. I will hand them out. You will also be surfing the net or reading science sections from the New York Times, the Columbus Dispatch, and some other sources.

Grading: One Credit-Pass/Fail

Attendance and class participation	QQQ points
Article assignment I (see below)	RRR points
Article assignment II (see below)	SSS points
5 minute presentation (see below)	TTT points
Total	UUU points

Week 1 An introduction to science. What is the scientific method? What is the scope and limitation(s) of science? How is science practiced and funded? What is the government's role in science? Should scientists pay any attention to ethics? Who is Bjorn Lomborg; where did he come from and why did he create such a stink in scientific community?
Read: The Preface, Language and Measures, and pages 1-33 and 217-226 of Lomborg. Handouts on secondhand smoke and obesity.

Week 2 Scientific Studies: Truth or Dare? What are the components of a good scientific study? What factors make a good study go bad? We'll look at one or two examples of government studies (secondhand smoke and obesity claims) and one pharmaceutical study (by posing a question: which is more dangerous, Vioxx or Viagra?).
Read: pages 327-352 and 178-181 of Lomborg. Handout on the FDA by John Stossel.

Week 3	Government agencies and funding. Does the EPA (and others) save lives? How much does it cost for each life saved? Does the FDA cost lives? Should we adopt cost/benefit analyses before funding science? We'll look at the Acid Rain controversy. Read: pages 34-42, 215-248 of Lomborg.
Week 4	The Media's Role in Science. Why does the media seem to get so many of its facts wrong? Why do you seem to always hear about the Doomsday Scenarios, but you rarely hear other, more moderate scenarios? Does the media have an agenda when it comes to science reporting? We'll focus on DDT, Rachel Carson, and malaria. Read: pages 45-49 of Lomborg, excerpt from Michael's *Meltdown*.
Week 5	The Scientist's Role in Science. We have a tendency to think of scientists as disinterested and objective warehouses of knowledge and information. While many of them are, or least try to be, some cross the line into advocacy, or even fraud. We'll look at the "population bomb" and we will start our discussions on global warming. We will also address the issue of what happens to scientists who propose alternative ideas and theories. We'll also talk about Thomas Kuhn and "paradigm shifts." Read: pages 258-324 of Lomborg, Newsweek article, article on the hockey stick graph.
Week 6	Global Warming Part I. The big kahuna of all socio-scientific issues. Back in 1976, I was in 8th grade and our science teacher read an article about global cooling (yes, COOLING). Our task was to figure out how to prevent the inevitable coming ice age. What has changed since 1976? We'll look at computer modeling, the different IPCC scenarios, and the famous hockey stick graph. We will also look at correlation and causation (independent and dependant variables). Read: Essenhigh's essay, excerpt from *Meltdown*.
Week 7	Global Warming Part II. Does carbon dioxide production drive global warming or could it be something else? What are some alternative theories and how would you test for them? We'll look at the snows of Kilimanjaro, the role of the sun, and discuss Essenhigh's essay on the arctic model. Read: pages 342-348 of Lomborg (re-read), article on food irradiation
Week 8	Global Warming Part III. You have heard all of the Doomsday Scenarios (or the Littany as Lomborg calls it) about global warming…but have you ever, *even one time*, heard about the benefits of global warming? We will discuss the benefits of global warming along with the benefits of El Niño, genetically modified foods, and food irradiation. Read: pages 118-136 of Lomborg, articles on ethanol and wind energy.
Week 9	Energy. We will run out of oil in a few years. We need to conserve, recycle, and focus on alternative energy sources such as solar power, wind energy, ethanol from corn, and biomass. Right? We'll look at the numbers and discuss economics along the way.
Week 10	In-class presentations/ discussions on current scientific events

Article Assignment I (due Week 10):

You have just been hired as the science reporter for a major newspaper. You have been asked by the editor to write an article about one of the topics below (or another with my prior approval). That article should discuss:

1) both or all sides of the issue
2) the science behind the issue (studies, data, etc.)
3) the social impacts

Article Assignment II (given Week 10):

Throughout the 10 weeks, collect four newspaper articles or press releases on science related topics. Write a paragraph or two on why you think the science behind it is sound or junk. Be prepared to discuss one of them during class in Week 10.

Potential Article Topics:

Hurricane Katrina/toxic soup	Chernobyl and the effects of radiation	Umbilical cord blood and toxins	New car smell causes cancer
Vioxx	Saccharin/Aspartame/Artificial Sweeteners	The population explosion	Stem cell research
Rainforests	El Niño	Acid Rain	Food Irradiation
Biota/Extinction	Intelligent Design/Evolution*	Guns vs. Crime^	Magnet Therapy
Power Lines and Cancer	Teflon and C8	Radioactive Waste Disposal	Ozone and CFC's
Breast Implants	Genetically Modified Foods	DDT/Malaria	Landfills/Recycling
Energy/Oil	Secondhand Smoke/ Tobacco	Environmental Mercury	Global Warming**
Food Safety	Low Fat Diets	Extreme Weather	Health Claims

*This one is a minefield. Talk with me first if you are tackling this one.
**If you are going to use this one, try to frame it using arguments or ideas that we haven't already discussed.
^Not so much hard science as sociological research…but studies abound….

Suggestions for further reading or investigation:
Meltdown by Patrick Michaels
State of Fear by Michael Crichton (quasi-fiction)
Bias by Bernard Goldberg
Freakonomics by Levitt and Dubner
JunkScience.com (and books by Steven Milloy)
Reason.com (articles and books by Ronald Bailey)
AnxietyCenter.com
Sound Science in the Courtroom (soundscience.net)
The Science & Environmental Policy Project (http://www.his.com/~sepp/)
American Council on Science and Health (http://www.acsh.org/)
Urban Legends (http://www.snopes.com/)
www.debunkers.org (blog)
Tech Central Station (http://www.tcsdaily.com/)

Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/info_for_students/csc.asp).

Disability Services

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/.

Bio:

John Herrington

Education:
B.S. Oakland University (Chemical Engineering) 1987

Teaching:
Chemistry 685-Safety Seminar since 1991

Research:
"An Electron Spin Resonance Study of the Reactions of Lipid Peroxy Radicals with Antioxidants." with J. Zhu, W.J. Johnson, C.L. Sevilla, and M.D. Sevilla. Journal of Physical Chemistry, 1990, 94.

"Sulfinyl Radical Formation from the Reaction of Cysteine and Glutathione Thiyl Radicals with Molecular Oxygen." with M.D. Sevilla, D. Becker, and S. Swarts. Biochemical and Biophysical Research Communications, Vol. 144, No. 2, 1987.