

Liberal Studies 2213: Science, Technology and Society: From Chaos to Consciousness

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Goals for LBST 2213: Science and technology play an increasingly important role in society. Appropriate public policy in these matters requires a scientifically literate citizenry. In addition, scientific literacy is, in and of itself, an important component of a liberal education. This General Education course is designed to provide UNC Charlotte graduates with the foundation necessary 1) for an understanding and appreciation of science, and 2) for an informed participation in public policy decisions related to science and technology. LBST 2213 will address the following topics: the history and philosophy of science, the criteria for distinguishing science from pseudo-science, the relationship of science to technology, and some specific example of the impact of science/technology on society. The courses should also include some discussion of the lives and personalities of pertinent notable scientists.

Objectives: The major objectives of this course are presented as questions to be answered by the students rather than as specific educational outcomes the course is intended to produce. Many of the answers to these questions will depend on the student's value system.

- What is the nature of science? What distinguishes science from pseudo-science?
- What are the strengths, weaknesses and limitations of science?
- Are there moral and ethical considerations in the development of scientific theories, either those that have potentially harmful technological applications or those that are in conflict with widely accepted religious beliefs?

In addition, the specific content objective is to explore in some detail the current scientific story of our origins. Starting with the Big Bang, we will discuss the formation of galaxies, the births and deaths of stars, and the formation of our Solar System. We will describe how an early inhospitable earth was transformed into an environment in which life could arise and flourish, and how, over the eons, life increased in diversity and complexity. We will discuss human evolution and speculate on the phenomenon of consciousness.

The story of the universe has been told in many ways. It is a hallmark of our species that we need a story of this kind. Every culture and all religions have had their own story that tells of the origin and purpose of creation and of the role and responsibilities of humans in that creation. The stories serve as foundations for ethics and morality; they provide a context in which life can be seen as meaningful. We now know that the literal descriptions contained in these stories are not true. We have developed a new story of origins, one that seems to be in much better accord with the empirical evidence, but one that is missing many of the important psychological and social features of the old stories. Can foundations for morality and meaningfulness survive in this new, scientific world view? Many people, both religious and non-religious, believe so.

Required texts:

1. *Voodoo Science: The Road from Foolishness to Fraud* by Robert Park, Professor of Physics, University of Maryland. Quote from the Introduction: "Of the major problems confronting society – problems involving the environment, national security, health, and the economy – there are few that can be sensibly addressed without input from science. As I sought to make the case for science, however, I kept bumping up against scientific ideas and claims that are totally, indisputably, extravagantly, wrong, but which nevertheless attract a large following of passionate, and sometimes powerful, proponents. I came to realize that many people choose scientific beliefs the same way they choose to be Methodists, or Democrats, or Chicago Cubs fans. They judge science by how well it agrees with the way they want the world to be."

2. *A Short History of Nearly Everything* by Bill Bryson. From primordial nothingness to this very moment, *A Short History of Nearly Everything* reports what happened and how humans figured it out. To accomplish this daunting literary task, Bill Bryson uses hundreds of sources, from popular science books to interviews with luminaries in various fields. His aim is to help people like him, who rejected stale school textbooks and dry explanations, to appreciate how we have used science to understand the smallest particles and the unimaginably vast expanses of space. With his distinctive prose style and wit, Bryson succeeds admirably.

Grading:

- 1) Three in-class exams during the semester (60%)*
- 2) Clicker quizzes based on assigned readings and Power Point presentations. Most of these can be accessed by a link from my home page. (20%) PRS Audience Feedback Transmitters (clickers) can be purchased new or used at the bookstore.
- 3) Final exam (20%)*
 - Study questions for the exams will be provided. You are encouraged to work in groups to prepare answers to these questions. Of course, you must understand the answers, as no notes or group work will be allowed while taking the exams. The exams will consist of a few short essay questions (taken directly from the study questions) and some additional kinds of questions. The final exam will be comprehensive and will be entirely multiple choice.

ACADEMIC INTEGRITY: Students have the responsibility to know and observe the requirements of The UNCC Code of Student Academic Integrity (Catalog p. 336). This code forbids cheating, fabrication or falsification of information, multiple submission of academic work, plagiarism, abuse of academic materials, and complicity in academic dishonesty. Any special requirements or permission regarding academic integrity in this course will be stated by the instructor, and are binding on the students. Academic evaluations in this course include a judgement that the student's work is free from academic dishonesty of any type; and grades in this course therefore should be and will be adversely affected by academic dishonesty. Students who violate the code can be expelled from UNCC. The normal penalty for a first offense is zero credit on the work involving dishonesty and further substantial reduction of the course grade. In almost all cases the course grade is reduced to F. Copies of the code can be obtained from the Dean of Students Office. Standards of academic integrity will be enforced in this course. Students are expected to report cases of academic dishonesty to the course instructor. The penalty for cheating on an exam is an F in the course. The penalty for cheating on a quiz is a zero on the quiz the first time and an F in the course the second time.

PRS Personal Response System (Your Clicker)

We will be using PRS RF (radio frequency) clickers. We will NOT be using the old PRS IR (infrared) style clickers.

Clickers will be used extensively during class, and clicker responses are graded. Each student in the course must have his or her own clicker, and each student must register his or her clicker in order to get course credit for using it.

You must use an ON-CAMPUS computer to access the registration website. You will not be able to register using an off-campus computer. Please note that some dorms are not part of the University network – if you are having trouble registering, try it from one of the computers in Atkins Library.

To Register:

- Go to <http://physics.uncc.edu>, click on Student Resources, and click on Register Your Clicker.
- Follow the instructions on the page to register your clicker. Make sure you follow the link in Step 1 and submit your information in the form. Instructions are provided regarding locating your clicker ID number.
- You are in section 300 and your instructor is Corwin

Schedule of Classes: Most of the material to be covered in the lectures is on the internet, usually in the form of a Power Point presentation. These are available from my home page. Just click on the LBST 2213 link. You should download this material prior to the class and bring it to class. I hope that much of the class time will be spent in class discussion rather than formal lectures. I'll need your help with this.

Aug 25 -- Introduction to the course and an overview of the Universe and our current understanding of it.

Aug 27 -- Greek Science (reading: The Birth of Science) Clicker quiz on reading.

Sept 1 -- The Middle Ages, Renaissance, and Reformation. Clicker quiz on Power Point.

Sept 3 -- The Scientific Revolution and the mechanistic-deterministic world view. Clicker quiz on the Scientific Revolution Power Point.

Sept 8 -- Film on the life of Darwin.

Sept 10 -- The beginnings of the loss of faith in the modern world view. Clicker quiz on Darwin film. Review for exam.

Sept 15 -- Exam 1.

Sept 17 -- The discovery of other galaxies and the expansion of space. Clicker quiz on Power Point.

Sept 22 -- General Relativity and its importance to cosmology. Clicker quiz on Power Point.

Sept 24 -- Distinctions between science and pseudoscience. Clicker quiz on Power Point.

Sept 29 -- Park chapters 1, 2, and 3. Clicker quiz.

Oct 1 -- Park chapters 8, 9, 10. Clicker quiz.

Oct 6 -- Student selected internet examples of pseudoscience.

Oct 8 -- Exam 2.

Oct 13 -- Fall break

Oct 15 -- The early Universe. Clicker quiz on Power Point.

Oct 20 -- The formation of stars and their evolution. Clicker quiz on Power Point.

Oct 22 -- The lives and deaths of stars. Clicker quiz on Power Point.

Oct 27 – Film on the Universe.
Oct 29 -- The formation of the Solar System. Clicker quiz on Power Point.
Nov 3 – The geological evolution of the earth. Clicker quiz on Power Point.
Nov 5 – Film on geological evolution.
Nov 10 -- Review for exam.
Nov 12 – Exam 3.
Nov 17 -- Discussion of the origins of life on earth and its evolution over time. Clicker quiz on Power Point.
Nov 19 -- Discussion of human evolution.
Nov 24 -- Film on human evolution.
Nov 26 – Speculations on human consciousness. Clicker quiz on Human Evolution.
Dec 1 -- Discussion of the theory of intelligent design.
Dec 4 -- Thanksgiving
Dec 8 -- Discussion of potential conflicts between science and religion.

The aim of a liberal education is not to turn out ideal dinner guests who can talk with assurance about practically everything, but people who will not be taken in by those who speak about all things with an air of finality. The goal is not to train future authorities, but people who are not cowed by those who claim to be authorities. The alternative to gullibility is not lack of respect for competence but the ability to find out who is competent and who is not.
Walter Kaufmann, in *The Faith of a Heretic*.

Merely having an open mind is nothing. The object of opening the mind, as of opening the mouth, is to shut it again on something solid.
G. K. Chesterton.