August 27, 2007

PHYS-230/230G, Section 001

CHANGING VIEWS OF THE UNIVERSE

Fall 2007

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Classroom: McKinley 108
Class Times: Monday and Thursday, 3:35-4:50 PM

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Office: McKinley Room 7 (aka "Studio C") in basement
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Thursday 1:00-3:00 PM
After Class
Other hours by appointment—*please feel free to contact me!*

Required Text: McClellan, J. E. and Dorn, H., *Science and Technology in World History: An Introduction*, Baltimore: The Johns Hopkins Press (1999). There also will be numerous handouts highlighting topics not covered in detail in the text, such as quantum mechanics and cosmology.

Course Description: PHYS-230/230G, Changing Views of the Universe, is a one semester course studying the development of science in Western society. We will focus on the evolution of physical science, especially as it relates to our conception of the universe writ large, i.e., the science of cosmology. We will begin with a review of the classical philosophers; emphasize the importance of the Scientific Revolution involving Galileo, Newton and others; undertake a whirlwind tour of modern physics, including relativity and quantum physics; and then focus on recent developments in cosmology, both empirical (e.g., measurements of the Cosmic Microwave Background) and theoretical (e.g., the possibility of multiple universes). We will conclude with a brief foray into biology, discussing evolution, DNA, and the possible future(s) of human evolution.

Please see the attached **Course Calendar** for more information regarding topical coverage (as well as key due dates for assignments).

General Education: PHYS-230G is a second-level course in the University's General Education program in Curricular Area 2: Traditions That Shape the Western World. As such, this course is intended to "convey ideas, visions, and cultural practices that are shared, lasting, and tenacious." Goals of Curricular Area 2 courses include to "understand the historical and philosophical traditions that shape the Western world," to "read and discuss fundamental texts from these traditions," and to "discuss the complex interplay between rich varieties of tradition and the necessity for change."

Prerequisites for PHYS-230G include one of the following: GOVT-105G, HIST-115G, JLS-110G, PHIL-105G, or RELG-105G.

Requirements: Your final course grade will be based on the following:

Participation (in-class and online):	10%
Short Papers x 4	40%
Term Paper	25%
Final Examination	25%

Please note that late assignments will not be accepted for credit.

Class Participation: Although this is a lecture based course, I encourage questions, comments, and a spirited give-and-take during class and online. Attendance is not mandatory, but—obviously—it will be difficult for you to earn participation points if you never show up for class! Moreover, it is likely that I will provide information during lectures, which could show up on the final exam, that will not be found in the required reading. Also, typically, assignments will be given during class.

Short Papers: Five short papers (i.e., 2-3 pages in length) will be assigned over the course of the semester. The purpose of these short papers is: (a) primarily, to stimulate critical thinking; and (b) secondarily, to keep you engaged in the class. In this regard, I define critical thinking as "fact-based, rational analysis". For each paper, I will present you with a question. You will provide a simple "yes or no" answer based on your fact-finding results and your analysis of the facts. Each question that I give you will be of the "no-right-answer" variety. Put another way, I will not care whether you answer "yes" or "no" to the question. What will matter to me is how you arrive at and justify your conclusion.

You will have two weeks to complete each paper. Due dates are set forth in the **Course Calendar.** I will only count four of the five papers toward your final grade. Therefore, you can ignore one of the assignments if you are pressed for time. Alternatively, you can do all five papers, resting assured that only your four best grades will count toward your final course grade.

Term Paper: You will have great leeway on the subject for your term research paper, but you must consult with me on the topic and provide an outline. I encourage you to choose a topic not covered in the lectures or reading (e.g., an aspect of non-Western science or a particular technological application). On the other hand, feel free to become an expert on a topic that we have touched on in class or in the readings. Although this is a non-technical course, I also encourage any student who is comfortable with math and physics to take on a technical project.

As a general rule, each paper should be 15-25 pages long (text plus diagrams, etc.). Your paper must be properly cited and documented. Due dates for topic approval, outline, and completion are set forth in the **Course Calendar**.

Final Exam: There will be NO midterms or quizzes (unless I am provoked by class apathy!). However, there will be a comprehensive final examination, the date and time of which is set forth in the **Course Calendar**. The final will be of the mixed variety, including multiple choice, true-false, short answer, and essay questions. Prior to the exam, I will walk you through the material for which you will be held accountable. The purpose of the final exam will be to test your mastery of the course material (both lectures and required readings).

You are required to take the final exam at the scheduled time and place. Makeup exams will be given only in the case of a documented emergency, subject to instructor approval.

Grading Scale: I will use the following grading scale:

A	>	93%
A-	>	89%
B+	>	87%
B	>	83%
B-	>	79%
C+	>	77%
C	>	73%
C-	>	69%
D	>	55%
F		*Don't go there!*

As a general rule, I do not like curving grades, but will do so if I believe that I have contributed to substandard class performance.

Getting Help: Believe it or not, I hate to see my students flounder or fail. If I detect that you are having trouble, I will seek you out and consult with you. If you feel that you are having trouble, by all means, seek me out. Talk to me! I stand ready to help you get the most out of this course.

Disabilities: If you are a student with disabilities, you should be registered with the University. In such a case, I will work to accommodate your needs.

Integrity: It is your responsibility to read, understand, and abide by the Academic Integrity Code. In particular, I expect you to submit only your own work, and to properly document anyone else's work upon whom you relied when researching your assignments. And I confess that I have a visceral dislike of all forms of cheating. Please do not go there.

Etiquette: While I encourage you to express yourself freely in class, online, and on paper, please be respectful and polite. In particular, please show up for class on time and refrain from disruptive activity during class, such as talking, eating, texting, etc.

Monday, August 27, 2007

PHYS-230/230G—Changing Views of the Universe

Course Calendar

Class	Date	Topic & *Key Dates*
1	M 8/27	**Introduction and Overview**
2	Th 8/30	**Early Developments**
--	M 9/3	Labor Day—No Class!
3	Th 9/6	**Greece I: The Pre-Socratics**
4	M 9/10	**Greece II: Socrates and Plato**
5	Th 9/13	**Greece III: Aristotle** *Due: 1st Short Paper*
6	M 9/17	**Medieval Efforts**
7	Th 9/20	**Scientific Revolution I: Copernicus and Kepler**
8	M 9/24	**Scientific Revolution II: Galileo**
9	Th 9/27	**Scientific Revolution III: Isaac Newton and His Times** *Due: 2nd Short Paper*
10	M 10/1	**Scientific Revolution IV: Newton and the *Principia***
11	Th 10/4	**Scientific Revolution V: Newton and His Competitors**
12	M 10/8	**Scientific Revolution VI: The Aftermath**
13	Th 10/11	**Relativity I: Albert Einstein, *c*, and the Special Theory** *Due: 3rd Short Paper*
14	M 10/15	**Relativity II: Gravitation and the General Theory**
15	Th 10/18	**Quantum Physics I: Uncertainty Principle and All That** *Due: Term Paper Proposal*

16	M 10/22	**Quantum Physics II: The World's Greatest Experiment**
17	Th 10/25	**Quantum Physics III: "Spooky Action-at-a-Distance"** *Due: 4th Short Paper*
18	M 10/29	**Modern Physics I: A House without a Roof**
19	Th 11/1	**Modern Physics II: So What Do We Do Now?** *Due: Term Paper Outline*
20	M 11/5	**Cosmology I: The Big Bang**
21	Th 11/8	**Cosmology II: Dark Matter and Dark(er) Energy** *Due: 5th Short Paper*
22	M 11/12	**Cosmology III: Our Universe Is Weird!**
23	Th 11/15	**Or Do We Live in a Multiverse I?**
24	M 11/19	**Or Do We Live in a Multiverse II (or III or IV)?**
--	Th 11/22	Thanksgiving—No Class!
25	M 11/26	**Darwin and Evolution**
26	Th 11/29	**DNA and Genetic Engineering**
27	M 12/3	**The Future of Evolution of Our Species**
28	Th 12/6	**Course Review and Summary** *Due: Term Paper*

FINAL EXAM: Thursday, December 13, 2:10–4:40 PM