

PHYS 309/PHIL 389
Philosophical Issues in Physics
TTh 11:00-12:15
184 Nieuwland

Spring 2003

Prof. Don Howard
100 Malloy Hall
Tel: 631-7547/-5015
Don.A.Howard.43@nd.edu
Office Hours: TTh 1:00-2:00

Text: James T. Cushing. *Philosophical Concepts in Physics*. Cambridge: Cambridge University Press, 1998.

Requirements: There will be five components in the computation of your final grade for the course:

(1) **Examinations** (40 %). At mid-term and during final examination week, there will be in-class examinations, each counting for 17.5% of the final grade. One week before each examination, a list of study questions will be distributed to assist you in preparing for the examination.

(2) **Term Papers** (30 %). Each student will be required to submit a final term paper, of a minimum of ten pages, on a topic to be worked out in consultation with the instructor.

(3) **Presentations** (20 %). Each student will be required to make a presentation to the class, this in the form of one's preparing a set of questions and observations about the assigned reading for a specific class meeting.

(4) **Class Participation** (10 %). The remaining ten percent of your final grade will be determined on the basis of the quality and extent of your enthusiastic participation in the class.

One-minute Papers: Every class session (excepting the day of the mid-term examination) will end a few minutes early to permit you to write a so-called "one-minute paper," in which you will write no more than two- or three-sentence answers to two questions: (a) What was the most important point covered in today's class? (b) What issue or question was left most unclear in your mind at the end of today's class? These one-minute papers will be required of every student at the end of every class session and will be collected at the end of class, but they will not be graded.

Attendance: No more than three unexcused absences will be permitted during the semester; for every additional unexcused absence, the student's final course grade will be reduced by one step on a plus/minus basis. Thus, for example, for a student with four unexcused absences, a final grade of B+ becomes a B, and for a student with five unexcused absences, a final grade of B becomes a C+. If you must miss a class for any reason, be sure to let me know beforehand, or as soon after the fact as possible, so as to enable me to determine whether or not to excuse the absence. I promise to be generous in allowing excused absences for legitimate purposes.

Schedule:

Date:	Topic:	Readings:
14 Jan.	Introduction to the course	
16 Jan.	Ways of Knowing	Cushing, Ch. 1.
21 Jan.	Aristotle and Francis Bacon	Cushing, Ch. 2.
23 Jan.	Science and Metaphysics	Cushing, Ch. 3.

28 Jan.	Observational Astronomy and the Ptolemaic Model	Cushing, Ch. 4.
30 Jan.	Absolute Sizes of the Planetary Orbits	Cushing, Ch. 4, Appendix.
4 Feb.	The Copernican Model and Kepler's Laws	Cushing, Ch. 5.
6 Feb.	Galileo on Motion	Cushing, Ch. 6.
11 Feb.	Newton's <i>Principia</i>	Cushing, Ch. 7.
13 Feb.	Newton's Law of Universal Gravitation	Cushing, Ch. 8.
18 Feb.	Some Old Questions Revisited	Cushing, Ch. 9.
20 Feb.	Galileo's <i>Letter to the Grand Duchess</i>	Cushing, Ch. 10.
25 Feb.	An Overarching Newtonian Framework	Cushing, Ch. 11.
27 Feb.	Determinism	Cushing, Ch. 12.
4 Mar.	Models of the Aether	Cushing, Ch. 13.
6 Mar.	Mid-term Examination	
11-15 Mar.	<i>Spring Break</i>	
18 Mar.	Maxwell's Theory	Cushing, Ch. 14.
20 Mar.	The Kaufmann Experiments	Cushing, Ch. 15.
25 Mar.	The Essentials of Special Relativity	Cushing, Ch. 16.
27 Mar.	Further Consequences of Einstein's Postulates	Cushing, Ch. 17.
1 Apr.	General Relativity and the Expanding Universe	Cushing, Ch. 18.
3 Apr.	The Road to Quantum Mechanics	Cushing, Ch. 19.
8 Apr.	Copenhagen Quantum Mechanics	Cushing, Ch. 20.
10 Apr.	Is Quantum Mechanics Complete?	Cushing, Ch. 21.
15 Apr.	The EPR Paper and Bell's Theorem	Cushing, Ch. 22.

17 Apr.	An Alternative Version of Quantum Mechanics	Cushing, Ch. 23.
22 Apr.	The Role of Historical Contingency	Cushing, Ch. 24.
24 Apr.	Status of Scientific Knowledge	Cushing, Ch. 25.
29 Apr.		
5 May	Term Papers Due (Mon., 5:00 PM)	
8 May	Final Examination (Thurs., 10:30 AM)	