PHL 241 History and Philosophy of Science  
MTWR 9:30-11:20

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Textbooks (required):
DeWitt (2004). *Worldviews: an introduction to the history and philosophy of science*. Blackwell (D)

**Course Goals:** Upon completion of this course, students should be able to:

1. Describe the main principles of the scientific theories we discuss in course.
2. Describe the empirical and conceptual problems faced by the theories we discuss in the course.
3. Describe the use of evidence (qualitative and quantitative) to confirm or disconfirm the theories we discuss in the course, and the role analytic uncertainty plays in confirmation.
4. Describe the philosophical problems raised by the historical episodes we discuss.
5. Describe the advantages and drawbacks of philosophical theories of science based on the history of science discussed in this course.

**Introduction:** This is a survey course of the epistemological and metaphysical development of natural philosophy or science from the Greeks through Einstein, a course in intellectual history. We will outline Greek views on the ultimate nature of reality, with an emphasis on Greek physics. We will pay special attention to the developments in the Scientific Revolution including the metaphysical shift to corpuscularianism and mechanism, and the new emphasis on experimentation. We will look at the ontological change in the conception of space and time after Newton, as well as views about the nature of scientific theories. We will examine the history of evolutionary theory with an emphasis on the kind of evidential support Darwin mustered for his theory. Finally, we will discuss philosophical issues related to the history that we have learned.

**Grading:** You will be graded on attendance (10%), two midterms (25% each), and a final (40%). Class attendance is crucial to your success on the exams. History, to a certain degree, lends itself to rote book learning, but philosophy does not. To understand the conceptual problems and developments over the course of the history of science, one has to actively engage in class. Be here, pay attention, ask questions when you are confused, and learn not only what happened, but what was at stake, and why things happened as they did. Towards that end, you may miss two classes without penalty (non-exam classes). Each additional class missed will incur a 5% reduction in final grade up to a total of 10%. Midterms and final will be a mix of multiple choice, short answer, and essay questions.

Make up exams and quizzes will be given only in extreme circumstances, family death, severe illness, severe car accident, etc. *Proof* of extreme circumstances is required in order to make up an exam. Oversleeping is not an acceptable excuse, nor busses running late, stuck in detox, etc. Take extra
precautions on exam or quiz days to avoid these problems. Exams or quizzes not taken, for any reason, will receive a zero. As always, the sooner you can notify me of a problem the better. E.g. if you are going to have surgery on an exam day, tell me beforehand! Note: I will not reschedule exams because you have booked an airline ticket on or before exam day!

Academic Misconduct: You are strictly held to the University of Montana Student Conduct Code (http://www.umt.edu-SA). The quizzes and exams are closed-note: you may not consult anything but your own mind in order to answer questions on the exam. You may not use cell-phones, or any electronic devices to aid you, nor fellow students, nor fellow students' answers, etc. You will receive no credit for any exam that you cheat on. Your conduct will also be reported to the Dean.

Classroom courtesy: Please turn off cell phones when you come into class. If you have to leave early, please indicate that to me before class begins, and let me know why you must leave early.

Special Needs: Students with disabilities will receive reasonable modifications in this course. Your responsibilities are to request them from me with sufficient advance notice, and to provide verification of disability and its impact from Disability Services. Please speak with me after class or during my office hours to discuss the details. For more information, visit the Disability Services for Students website at www.umt.edu/dss/

TENTATIVE Schedule (see Moodle for up to date schedule alterations, especially for reading assignments):

Week 1: 
- Worldviews and Truth D1-2
- Empirical/Conceptual Facts, Evidence and Reasoning D3-D4
- The Duhem-Quine thesis, D5

Week 2: 
- The Problem of Induction D6
- Falsifiability, Realism/Instrumentalism D7-D8
- Pythagorean/Platonic worldviews, Aristotelian worldview Lindberg, 2, 3 (on Moodle)
- Heleocentric and Geocentric Astronomy D9-16

Week 3: Exam on Monday 6/9
- Galileo’s telescopic evidence, Newtownian worldview D17-20
- Relativity D22-23
- Start background to Darwin's theory E1-4

Week 4: Exam on Thursday 6/19
- Background to Darwin's theory (cont.) E1-4
- Darwin's theory, developments, and criticisms E5-8
- Cultural and Scientific reactions/developments to Darwin’s theory E9-12

Week 5: 
- Scientific Progress (Kuhn, “On the Nature and Necessity of Scientific Revolutions’’,
- “Objectivity, Rationality, and Theory Choice’’ (on Moodle)
- Quantum theory D24-28

Final: Thursday 6/26