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### PHL 241N.01: History and Philosophy of Science

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# Philosophy 241HN MWF11-11:50

## Syllabus

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### Office hours and contact information

Professor Armond Duwell

Office: LA 154

email: armond.duwell@umontana.edu

office hours: W 12-12:50, F 10-10:50 and by appointment

### Technology Policy

This will be (save for what I need for presenting course materials) a tech-free classroom. That means all phones need to be turned off and put away. No laptop computers will be allowed either. If you want to take notes, and I highly recommend it, you should use a notebook. Deviations from this policy will be accepted only if it is recommended by DSS.

### Summary

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.

### Course Goals

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

1. Describe the main tenants 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 philosophical problems raised by the historical episodes we discuss.
4. Describe the advantages and drawbacks of philosophical theories of science based on the history of science discussed in this course.

## Required Texts

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

Larson (2004). *Evolution. The Remarkable History of a Scientific Theory*. The Modern Library (E)

## 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!*

## Attendance and Etiquette:

Attendance is crucial in this course. It is impossible to learn philosophy without doing it, i.e. engaging in philosophical discussion. You are expected to arrive on time, stay for the duration of class and participate in discussion. If you have to leave early, please tell me at the beginning of class and sit close to the exit to minimize the disturbance to the class. Cell phones should be turned off for the duration of class. You will be asked to leave if

you are doing anything not relevant for class, e.g. reading the newspaper, sleeping, doing work for other classes, etc.

If you do have to miss a class, it is YOUR responsibility to find out what was covered, learn that material, and prepare for the next class appropriately. Moodle will be the primary means by which I convey what material is covered and what you are responsible for preparing.

## **Academic Misconduct:**

You are strictly held to the University of Montana Student Conduct Code (<http://www.umt.edu.SA>). The 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 on exams, etc. You will receive no credit for any exam that you cheat on. Your conduct will also be reported to the Dean of Students.

## **Special Needs:**

Students with disabilities will receive reasonable modifications in this course related to those disabilities. Your responsibilities are to request them from me with sufficient advance notice, and to be prepared 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/](http://www.umt.edu/dss/). Please inform me if you have any accessibility issues.

## **Tentative Schedule:**

This schedule is likely to fluctuate. For the most up to date class information, look on Moodle. You are held responsible for staying up to date in class even if you were absent. If you are absent, please contact me as soon as possible to know what your current responsibilities are.

### **Week 1**

Worldviews and Truth D1-2

### **Week 2**

Empirical/Conceptual Facts, Evidence and Reasoning D3-D4

### **Week 3**

The Duhem-Quine thesis, The Problem of Induction D5-D6

### **Week 4**

Falsifiability, Realism/Instrumentalism D7-D8

### **Week 5**

No class on Monday 2/19

Pythagorean/Platonic worldviews, Aristotelian worldview, Lindberg, 2, 3 (on Moodle).

### **Week 6**

Helio-centric and Geocentric Astronomy.  
D9-16

### **Week 7**

Galileo's telescopic evidence, Newtownian worldview  
D17-20

### **Week 8**

EXAM 1 Monday 3/12 (Covers everything through Helio-centric and Geocentric Astronomy).

Relativity D22-23

### **Week 9**

Background to Darwin's theory E1-4

### **Week 10**

SPRING BREAK

### **Week 11**

Darwin's theory, developments, and criticisms E5-8

### **Week 12**

Cultural and Scientific reactions/developments to Darwin's theory E9-12

### **Week 13**

EXAM 2 On Monday 4/16, from Galileo's telescopic evidence through Larson's book.

Scientific Progress (Kuhn, ``On the Nature and Necessity of Scientific Revolutions'' (on Moodle)

``Objectivity, Rationality, and Theory Choice'' (on Moodle)

### **Week 14**

Quantum theory D24-28

### **Week 15**

Finish up, review

FINAL THURSDAY MAY 10<sup>th</sup>, 10:10-12:10