

History 407
The Rise of Modern Science
Fall 2001

Instructor: Stephen McCluskey

TTh 2:30-3:45

Office Hours: TTh 3:45-5:00

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202-D Woodburn

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Web page: [HTTP://WWW.AS.WVU.EDU/~SCMCC/](http://www.as.wvu.edu/~scmcc/)

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Required Texts:

Thomas S. Kuhn. *The Copernican Revolution: Planetary Astronomy in the Development of Western Thought*

Peter Dear. *Revolutionizing the Sciences: European Knowledge and Its Ambitions, 1500-1700*

Galileo Galilei. *Galileo on the World Systems* (ed. and trans. Maurice A. Finocchiaro)

René Descartes. *Discourse on Method, Optics, Geometry, and Meteorology* (trans. Paul J. Olscamp)

Isaac Newton. *Newton's Philosophy of Nature: Selections from his Writings* (ed. H. S. Thayer)

A colleague of mine once asked me to define briefly the central core of the scientific revolution so he could sum it up briefly for his course on Western Civilization. That was an obvious question, since, the scientific revolution was an event that drastically reoriented Western thought and fundamentally changed our ways of perceiving the world and of acting upon it, and thereby altered the relations between intellectual activity and the world of practice. So it seemed, at first, that his question deserved a simple answer, but the more I thought about it, the more convinced I became that there are very many different ways of trying to understand that complex, revolutionary, event.

To get at this multifaceted event, in the first part of the course we will examine a number of major events in the scientific revolution, the persons who made these discoveries, and the intellectual, social, and institutional contexts within which those discoveries were made. In the second part of the course I would like us to take a look at a number of historical interpretations of the scientific revolution.

I have chosen two different kinds of books for this course. The first kind includes two complementary studies of the scientific revolution. The older of these, Thomas Kuhn's *Copernican Revolution*, is a history of ideas, focusing on the emergence of Copernicanism and its broader influence on Western thought. Peter Dear's *Revolutionizing the Sciences* was written over forty years later and represents a later generation's focus on the social and institutional context of scientific change. Incidentally, I was trained on Kuhn, and find his approach more congenial.

The second set of books are selections from the writings of three of the major participants. We must come to grips with the new ideas of Galileo, Descartes, and Newton if we are to begin to understand the scientific revolution. These authors approached the world differently from their predecessors, and from each other, and often came to different conclusions. Their disagreements on

a number of important issues are central elements in the development of the new science. As these books suggest, the course will combine elements of a lecture course with those of a discussion course based on the close reading of original documents.

Each student will be expected to read all the assigned readings and present short written reports (300-500 words each) on a number of the assigned readings in the course of the semester (5 for undergrads; 8 for graduate students). Since the discussions will rely on everyone to have carefully read the assigned texts, the assignments must be completed before the class on which they are to be discussed. To assist in preparing for the discussion, all students will be expected to prepare two discussion questions that may help clarify difficult points in the assigned readings. In addition, late written reports will automatically forfeit a full letter grade.

In addition, students will prepare a short essay (1000-1200 words) based on their own readings in the secondary literature that examines one of the broader issues of the scientific revolution. A prospectus and bibliography will be due on Thursday, Sept. 13 and the essay will be due Tuesday, Dec.

Given the different expectation of performance from undergraduates and graduate students, there will be different grading requirements for students of different levels:

	Undergraduates	Grad Students
Written Reports	5 @ 40 = 200	8 @ 40 = 320
Essay	100	150
Mid-Term Exam	125	125
Final Exam	200	200
Total	625	795

TENTATIVE SCHEDULE OF CLASSES

All members of the class will be expected to have read assignments before class on the day for which they are assigned.

Aug 21 Historiographic Introduction to the Scientific Revolution

Aug. 23 Some Historical Issues in the Scientific Revolution

Dear, pp. 1-9

Kuhn, pp. 1-4

Aug. 28 The Nature of Ancient Astronomy

Kuhn, pp. 4-44

Aug. 30 The Problem of the Planets — Ptolemy's Solution

Kuhn, pp. 45-77

Sept. 4 Aristotelian Cosmology

Kuhn, pp. 78-99

Dear, pp. 10-15

Sept. 6 The Medieval Background to Copernicus

Dear, pp. 18-29

Kuhn, pp. 100-133

Sept. 11 Copernicus and his Contemporaries

Kuhn, pp. 133-184

Dear, pp. 30-48

Sept. 13 The Reception of the New World View

Prospectus and Bibliography for Essay due

Kuhn, pp. 185-219

Dear, pp. 72-79

Sept. 18 Galileo and the Heavens

Kuhn, pp. 219-228

Dear, pp. 64-71, 131-134

Galileo, pp. 1-7, 32-69

Sept. 20 No Class

Sept. 25 Galileo on the Sources of Human Knowledge
Galileo, pp. 91-116

Sept. 27 Galileo, Vertical Fall, and Experiment
Galileo, pp. 155-170

Oct. 2 Galileo, Why Objects Stay on a Rotating Earth
Galileo, pp. 171-193; 197-212

Oct. 4 **Mid Term Exam**

Oct. 9 Galileo and the Telescope
Galileo, pp. 221-244

Oct. 11 Galileo on Stellar Parallax
Galileo, pp. 264-281

Oct. 16 Galileo on the Tides
Galileo, pp. 282-308

Oct. 18 Descartes' Universe
Dear, pp. 80-100

Oct. 23 Descartes, *On Method*
Descartes, *On Method*, pp. 3-62
See also Descartes' treatment of matter in his second and third *Meditations*, which I have placed on reserve.

Oct. 25 On Light, Reflection, and Refraction
Descartes, *Optics*, pp. 65-83

Oct. 20 On Vision
Descartes, *Optics*, pp. 84-113

Nov. 1 On Color and the Rainbow
Descartes, *Meteorology*, pp. 332-352

Nov. 6 Newton's Principles of Philosophy
Dear, pp. 138-145. 149-167

Nov. 8 Newton On Light and Color

Newton, pp. 68-81, 99-105

Nov. 13 Newton on Chemical Attraction

Newton, *Optics*, query 31, pp. 159-179

Nov. 14 No Class — Read Newton's discussion of Experimental Method

Newton, pp. 1-11

Nov 17-25 Thanksgiving Holiday

Nov. 27 Newton On Gravity

Newton, pp. 105-112

Nov. 29 Ether and Gravity

Newton, pp. 82-99, 112-116, 142-144

Dec. 4 God and the Cause of Gravity

Essay Assignment Due

Newton, pp. 50-58

Dec. 6 God, Necessity, and Natural Philosophy

Newton, pp. 41-50, 116-134, 155-156

Tuesday, Dec. 11 8:00 - 10:00 AM

Final Exam