HISTORY 271

Science, Religion, and Myth

Fall 2004

Instructor: Stephen McCluskey
Office Hours: TTh 3:45-5:00
202-D Woodburn
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TTh 11:30 - 12:45
105 Woodburn

Required Texts (in paperback):

David C. Lindberg. *The Beginnings of Western Science*
Richard S. Westfall. *The Construction of Modern Science*
Mary Lynn Rampolla. *A Pocket Guide to Writing in History*

This course focuses on the areas where I've done most of my research; I hope you find it as much fun as I do. Its central theme is the historical development of ideas about nature, from their prehistoric origins to the establishment of Newtonian science. In tracing this theme we will occasionally come into contact with other approaches to nature: religion, myth, magic, and technology. Nonetheless, the central theme of the different ways that scientific ideas and institutions function at different times and places will take up the major portion of the course.

I expect you to get three things out of this course. The first is an understanding of the historical process by which human understandings of nature developed and how, as scientific understandings of nature developed, those understandings related to other kinds of understandings expressed in religious or mythological terms. Second is an understanding of how historians come to understand events that took place in the past, including the historical development of scientific ideas and institutions. But the last thing you learn may, in the long run, be even more useful. In the course of the semester you will write a lot: essay questions in exams and a major term paper. These projects will give you practice in organizing evidence to demonstrate a point, something you'll find yourself doing in formal and informal settings for the rest of your life.

Despite the course's focus on science this is a history course, not a science course. That means that those of you who don't feel comfortable with science won't be loaded with a lot of the scientific detail that you don't really understand. On the other hand (notice how professors always seem to have (at least) two hands), it means that you're going to have to learn some of the specific historical details and understand how those details form a coherent picture of how sciences "fit" into specific times and places. If you find me talking about something that you don't quite understand, feel free to ask a question. I really don't mind, I've been working at this for so long that I sometimes take things for granted or use words in special senses that you might not be familiar with. Some of the most interesting classes have been when people asked what seemed – at first – like a dumb question.

At WVU students and professors don't see much of each other – especially in classes this big. It's one of the problems of a large university but it doesn't need to be that way. Feel free to wander up to the second floor of Woodburn during office hours to drop in. If you're handy with E-Mail, drop me a line and I should get back to you shortly. I like this class, I enjoy talking about it, and would be glad to answer your questions, point you in promising directions on your term paper, or just chat

about anything that seems interesting. If my office hours don't fit your schedule, drop in or give a ring and we can work out a mutually convenient time.

Requirements and Grading Policy

My grading philosophy is that the grades of A and F are exceptional grades. It is hard to get an A in this course; it is also hard to fail. The two easiest ways to fail are by not completing all the required assignments or by engaging in plagiarism or other kinds of academic dishonesty.

Exams: The Mid-term Exam will be on Thursday, Oct. 8. It will consist of one essay question and a number of short identification questions. The Final Exam will be held as scheduled in the University Schedule of Examinations from 3:00 to 5:00 PM on Friday, Dec. 17 in the regular classroom. It will be similar to the mid-term, consisting of two essay questions, one covering the last half of the course and one comprehensive question, and a number of short identification questions. A study guide, including the essay questions to appear on the exam, will be passed out about a week before each exam.

Attendance: I take attendance almost every day of class. Points are deducted for every day missed. Missed days for which you give me a reason will be counted as a half-day missed (even in the business world there's usually some cost for sick days taken).

Term Paper: In addition, a 1500-2000 word paper (7-10 typewritten pages) will be required, presenting a *historical* analysis of one aspect of the history of science, (preferably focusing on its relations with religion or myth) at a specific time and place prior to the year 1720. (A discussion of these topics in a more recent "primitive" culture will also be acceptable.) The paper must deal with this topic in a critical manner and be based upon evidence you have gathered from a range of secondary sources (books, journal articles, etc.).

On Thursday, Sept. 16 you will turn in a typed half-page prospectus discussing the central question you plan to raise and the kinds of evidence you will use to answer them, along with a typed twenty item working bibliography of books and articles in scholarly journals that you believe might provide such evidence. This will be returned with recommended changes, additions, etc. on Thursday, Sept. 23.

A typed first draft of the paper, *accompanied by the graded prospectus and bibliography*, will be due Thursday, Oct. 28 and will be returned during office meetings scheduled on Wednesday through Friday, Nov. 3-5. The first draft will follow the style given in Rampolla's *Pocket Guide* and include full footnotes (or endnotes) and a bibliography of the references *actually used* in preparing the paper. Parenthetical in text references, e.g. (Jones 1987: 23-26), are **not used** in historical writing. *Bring the principal reference works* you have used to this meeting so we can discuss your use of the sources and their limitations.

The final draft of this paper, revised on the basis of criticisms of the first draft, will be submitted *along with the graded prospectus and first draft*, on Tuesday. Dec. 7. The final draft should not merely answer the questions noted on the first draft, but should represent *a substantial revision and improvement* of the first draft. It will therefore be graded more rigorously.

Late Assignments: All late assignments will be graded more severely than if they were submitted on time. Since the process of writing, grading, and revising a term paper takes time, each phase of the paper project must be submitted several weeks before the next assignment. To make sure that you have sufficient time to revise your paper, I will only accept prospectuses and first drafts submitted on, or within two weeks, of the due date. **Prospectuses and first drafts not received within two weeks of the due date will receive a grade of incomplete (0 points) and all subsequent parts of the term paper project will receive a grade reduced by one letter grade.** Given the weight which the term paper carries in calculating the course grade, this will seriously influence your final course grade.

Make-up examinations will generally be somewhat more difficult than the exam given on the assigned date.

Academic Ethics: Academic research takes as one of its guiding principles the assumption of honesty; deceit of all kinds is one of the cardinal academic sins. I expect students' papers to represent their own work and to present their own ideas. All cases of plagiarism will be reported to the dean in accordance with the formal procedures outlined in the Undergraduate Catalog. Depending on the severity of the offense, plagiarism will lead to anything from a failing grade in the assignment to a failing grade for the course. Flagrant offenders can suffer additional university penalties. If you don't know what plagiarism is, find out. There is a clear discussion in Chapter 6 of Rampola's *Pocket Guide to Writing in History.*

The final grade for the course will be determined on the following basis:

Attendance	50 points
Mid Term Exam	100 points
Prospectus / Bibliography	25 points
First Draft of Paper	50 points
Final Draft of Paper	125 points
Final Exam	150 points
COURSE TOTAL	**500 points**

Grade records are kept on a numerical, rather than a letter grade basis. Keep that in mind if you are trying to compute your expected grade.

Schedule of Classes

You will be expected to have read the assigned readings *before* the class of the day for which they are assigned.

Tue. Aug 24 Term papers, bibliographic tools, and an introduction to the Library

Thu. Aug 26 Science and Religion; Technology and Magic

Discussion attempting to establish working definitions of **Science, Religion, Technology and Magic** in order to differentiate among these four human activities.

Lindberg, pp. 1-4

Tue. Aug 31- Thu Sept. 2 Natural Knowledge in the American Southwest

FILM: *The Sun Dagger*

Taking the Puebloan peoples as an example, we will begin to consider the practice of science in traditional, non-literate cultures. What are the religious reasons for such practices; what are the scientific reasons? What do these suggest about the mutual relationships of science and religion?

Lindberg, pp. 4-20

Tue. Sept. 7 Writing a History Paper

Discussion of the problems we all encounter in formulating a good historical question, in finding and evaluating the evidence to answer that question, and in presenting our answer to that question.

Rampolla, pp. 1-14, 26-34, 39-63, 70-83.

Thu. Sept. 9 The Ionian Greeks and the rejection of myth

The early Greeks developed models of explanation that differed significantly from earlier explanations. Consider both the causes and effects of these differences.

Lindberg, pp. 20-35

Tue. Sept. 14 Plato and the Religion of Rationality

Discussion of Plato's criticism of the astronomy of his predecessors. Considering the achievements that have been recounted for the techniques of traditional astronomy, what are we to make of Plato's criticism of predictive astronomy? What is the goal of science if it is not merely prediction? How is this goal attained? Is it even attainable?

Handout: Plato on Mathematical Astronomy (*Republic*, $527^{d\text{-}e}$; 528^{e}-530^{c})

Lindberg, pp. 35-45

Thu. Sept. 16 Aristotle and the Contemplative God

Term Paper Prospectus and Bibliographic Exercise Due

Like most good students, Aristotle ended up by disagreeing with much of what he was taught. Consider the differences between the concept of the world held by Plato and that of his student, Aristotle.

Handout: Aristotle, *On the Parts of the Animals,* $644^{b}22$-$645^{a}26$

Lindberg, pp. 47-68

Tue. Sept 21 Ptolemy and the Mathematical Tradition

Mathematics and Science were first closely linked in the sciences of Optics and Astronomy. What role(s) does mathematics play in linking our observations and our understanding of them? Is science necessarily mathematical?

Lindberg, pp. 85-110

Thu. Sept. 23 Healers and Healing in Antiquity

Term Paper Prospectus and Bibliographic Exercise Returned

Medicine was the earliest profession to claim to base its activities on scientific grounds. "Scientific" physicians emphasized how they differed from religious healers and unscientific quacks. This claim did much to transform how they studied the causes of disease and practiced medicine.

Lindberg, pp. 69-83, 111-131

Tue. Sept. 28 Late Antiquity and the decline of learning

Discussion of the factors leading to the decline of the scientific enterprise and the attempts made by Roman scholars to preserve the tradition of Ancient learning.

Handout: Time and Timekeeping in Late Antiquity.

Lindberg, pp. 133-159, 348-353

Thu. Sept. 30 Practical Knowledge of the "Dark Ages"

Early medieval thinkers were less concerned with the development of new insights into nature than with the preservation of practical knowledge. Compare this with the practices of traditional cultures. In such a situation, what would be the likely attitude towards scientific innovation?

Lindberg, pp. 183-190

Tue. Oct. 5 Islamic Monotheism and the Unity of Wisdom

"There is no God but God..." reflects the Islamic world's rejection of pagan polytheism. Consider the impact of this uncompromising monotheism on the Islamic world's attitude towards nature and towards ways of understanding nature.

Lindberg, pp. 161-182

Thu. Oct. 8 **Mid-term Exam** (Through unit on Islam)

Tue. Oct. 12 The Recovery of Ancient Learning

The revival of learning brought together the learning of antiquity, that of the "dark ages" and that of the Islamic world. Pay particular attention to changing attitudes towards education and learning.

Lindberg, pp. 197-206, 261-267

Thu. Oct. 14 The Rise of the Universities.

Lindberg, pp. 206-234

Tue. Oct. 19 The Religious critique of Aristotelian rationalism

Discussion of the conflict between Aristotle's concept of science as based on necessary laws and the Christian concept of a powerful and loving God, as it influences the reception of Aristotelian science.

Lindberg, pp. 234-244

Thu. Oct. 21 The Medieval Science of Motion

using mathematics to describe the motion of bodies was not invented in the Renaissance, but began with scholastic discussions in the Medieval universities.

Lindberg, pp. 281-307

Tue. Oct. 26 The Medieval Cosmos

The one mathematical science almost all students studied in the middle ages was astronomy, which provided a link between Aristotle's physics and the concepts of mathematical astronomy.

Lindberg, pp. 245-261, 268-280

Thu. Oct. 28 Copernicus and the Transformation of Astronomy
Typed First Draft of Paper Due (Along with Graded Prospectus)
Handout: The Sun in Renaissance neo-Platonism
Lindberg, pp. 355-368

Tue. Nov. 2 **Election day – Recess**
Be Sure to Vote!

Thu. Nov. 4 Tycho, observation, and Copernican Astronomy
Tycho Brahe performed many highly precise astronomical observations, yet he remained an opponent of the Copernican system. What does this suggest about the role of observation in science?
Westfall, pp. 1-12

Nov. 3-5 Office Meetings to Discuss First Draft of Papers
Remember to Bring Your Sources to the Meeting

Tue. Nov. 9 Celestial Harmonies and the New Astronomy
Johann Kepler was something of an mathematical mystic and ranked observation below mathematical harmonies as the key to understanding the universe, yet he supported Copernicanism while the observer Brahe rejected it. How do we explain this paradox?

Thu. Nov. 11 Bruno and the Reception of Copernican Cosmology
Giordano Bruno reflects a magical element of Renaissance thought. Copernicus's new cosmos offered him the opportunity to create a new vision of the universe in which nature would be viewed as alive to an even greater extent than the medieval world view.

Tue.. Nov. 16 Galileo and the Reception of Copernican Astronomy
Consider Galileo's astronomical discoveries and the reactions of the religious establishment. Keep alert for the motives behind the religious reaction to Galileo.
Westfall, pp. 13-24

Thu. Nov. 18 Galileo and the New Mechanics
Galileo is often said to be an experimenter who rejected all ancient authority. Consider the role of experiment and ancient learning in Galileo's mechanical investigations.

Nov. 20 - Nov. 28 **Thanksgiving Break**

Tue. Nov. 30 Descartes and the Mechanical Philosophy
Westfall, pp. 30-56

Thu. Dec. 2 Gassendi, Newton and the new view of science
Discussion of Newton, his educational background, and the influences on his scientific development.
Westfall, pp. 65-81, 105-138

Tue. Dec. 7 Newton's Experiments in Optics
Final Version of Paper Due (Along with Graded Prospectus and First Draft)
Westfall, pp. 56-64

Thu. Dec. 9 Newton and the *Principia*
Westfall, pp. 139-159

Fri. Dec. 17 Final Exam (3:00 – 5:00 PM)
No, I didn't schedule the exam for this time. No, I can't arrange another time.