I enjoy this course more than any other I teach; 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 development of scientific ideas and institutions will take up the major portion of the course. The formal definition in the University catalog reads:

History 11 -- Science, Religion, and Myth Surveys human understandings of nature from prehistoric astronomies and Babylonian myths through ancient and medieval thought to the new sciences of Copernicus, Galileo, and Newton.

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. In fact, some of the most interesting classes happen when people ask what seems, at first, like a dumb question.

FOR BETTER OR FOR WORSE

BY LYNN JOHNSTON

At WVU students and professors don't see much of each other outside of classes; 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

The MID-TERM EXAM will be on Tuesday, Oct. 5. It will consist of one essay question and a number of short identification questions. The essay question will require you to The FINAL EXAM will be held as scheduled in the University Schedule of Examinations from 3:00 - 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 questions to appear on the exam, will be passed out about a week before each exam.

In addition, a 1500-2000 word paper (7-10 typewritten pages) will be required, presenting a historical discussion of one aspect of science and its relations with either 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 secondary sources (books, journal articles, etc.).

On Tuesday, Sept. 14 you will turn in a typed half-page prospectus discussing the question(s) 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 Tuesday, Sept. 21.

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 Monday through Wednesday, Nov. 1-3. 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. Bring the principal reference works you have cited 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 correct minor grammatical and mechanical points but should represent a substantial revision and improvement of the first draft. It will therefore be graded more rigorously.

Make-up examinations and late papers will be graded more severely than those submitted on the assigned date and will generally have a lower grade than if they were submitted on time.

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Points</th>
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<tbody>
<tr>
<td>Attendance / Participation</td>
<td>50</td>
</tr>
<tr>
<td>Mid term exam</td>
<td>100</td>
</tr>
<tr>
<td>Prospectus / Bibliography</td>
<td>25</td>
</tr>
<tr>
<td>First Draft of Paper</td>
<td>50</td>
</tr>
<tr>
<td>Final Draft of Paper</td>
<td>125</td>
</tr>
<tr>
<td>Final Exam</td>
<td>150</td>
</tr>
<tr>
<td><strong>COURSE TOTAL</strong></td>
<td>500</td>
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</tbody>
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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. In the event of a borderline grade, class participation will be considered to determine whether the Final Course Grade should be a higher or lower letter 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, bibliographies, 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  The Sun and the cycle of Sacred Time
FILM:  The Sun Dagger
Taking astronomical shrines and rituals of a number of cultures as examples, 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 4-13

Thu. Sept. 2  Babylonian myth, ritual, and astronomy
Among their other functions, myths embody answers to scientific questions. Are such myths properly considered science? Why or why not?
Lindberg, pp. 13-20

Mon. Sept. 6 - LABOR DAY

Tue. Sept. 7  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

Thu. Sept. 9  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?
Lindberg, pp. 35-45
Tue. Sept. 14 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.
Lindberg, pp. 47-68

Thu. Sept. 11 Healers and Healing in Antiquity
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. 21 Ptolemy and the Mathematical Tradition
TERM PAPER PROSPECTUS AND BIBLIOGRAPHIC EXERCISE
RETURNED
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 The monastic learning of the "Dark Ages"
Discussion of the factors leading to the decline of the
scientific enterprise. 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. 133-159, 183-190, 348-353

Tue. Sept. 28 Islamic Monotheism and the Unity of Wisdom
FILM: The Frozen World (Civilization)
"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. Sept. 30 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
Tue. Oct. 5  MID-TERM EXAM (Through unit on Islam)

Thu. Oct. 7  The Rise of the Universities.
            Lindberg, pp. 206-234

Tue. Oct. 12  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. 14  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. 19  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. 21  Copernicus and the Transformation of Astronomy
            Lindberg, pp. 355-368

Tue. Oct. 26  Tycho, observation, and Copernican Astronomy
            Westfall, pp. 1-12
            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?

Thu. Oct. 28  Celestial Harmonies and the New Astronomy
            TYPED FIRST DRAFT OF PAPER DUE (ALONG WITH GRADED
            PROSPECTUS)
            Johann Kepler was something of a 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?

Nov. 1-3  NO CLASSES
         Office Meetings to Discuss First Draft of Papers
         REMEMBER TO BRING YOUR SOURCES TO THE MEETING
Thu. Nov. 4  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. 9  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. 11  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.

Tue. Nov. 16  Descartes and the Mechanical Philosophy
Westfall, pp. 30-39, 43-56

Thu. Nov. 18  Gassendi's Retreat from Certainty
Westfall, pp. 39-42

Nov. 20-28  THANKSGIVING BREAK

Tue. Nov. 30  Applied Science and The Revival of Alchemy
Westfall, pp. 65-81, 105-119

Thu. Dec. 2  Newton and the new view of science
Discussion of Newton, his educational background, and the influences on his scientific development.
Westfall, pp. 120-138

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)
I didn't pick this time and I can't do anything to change it. We've all been done in by the bureaucracy.