History 281

Magic, Marvels, and Nature in the Pre-Modern World (An Introduction to the History of Science)
Fall 2015
Wed. 1:00 – 3:45
MSS 216
Prof. Bruce T. Moran
Office: MSS 210
Office hour: Wed. 4:00 – 5:00 and by appt
Office Phone 784-6677
moran@unr.edu

History 281R focuses upon the historical impact of scientific and technological knowledge, within frameworks of social, political, religious, and commercial life. In general, it is an introduction to the history of science from the time of the pre-Socratics to the age of Isaac Newton. As we will see, the way nature and the body have been described and the methods chosen for inquiring into the physical world have changed greatly over the centuries and have often depended upon specific cultural values, religious assumptions, and political and economic desires. One of the aims of this course is to help you fashion a general knowledge of how the major changes in the conceptual understanding of the physical world came about and to inform you of the challenges that confronted those whose discoveries and opinions opposed conventional or established views. The course will also give due consideration to the relation between technological innovations such as printing and instrument making and scientific discovery. Another aim will be to highlight interrelations between science and society, as discoveries (including the discovery of the New World) are considered against a background of political, commercial, and religious change. Finally, the course also emphasizes the influence of quantification, natural magic, and the psychological motivations of such leading figures in the so-called “Scientific Revolution” as Galileo, Kepler, Bacon, and Newton in the process of intellectual change.

This course satisfies Core Objectives 9 of the Silver Core Curriculum

CO9: Students will be able to connect science and technology to real-world problems by explaining how science relates to problems of societal concern; be able to distinguish between sound and unsound interpretations of scientific information; employ cogent reasoning methods in their own examinations of problems and issues; and understand the applications of science and technology in societal context.

In addition, Hist 281R helps students to refine skills described in Core Objectives 1 and 3. These objectives are reinforced throughout the curriculum in other courses students take to fulfill core and major requirements.
CO1. Effective Composition and Communication: Students will be able to effectively compose written, oral, and multimedia texts for a variety of scholarly, professional, and creative purposes.

CO3. Critical Analysis and Use of Information: Students will be critical consumers of information, able to engage in systematic research processes, frame questions, read critically, and apply observational and experimental approaches to obtain information.

Skills-Based Curriculum

The history program at UNR helps students to develop proficiency in broadly applicable skills while mastering specific subject areas. In addition to learning about the role of racial ideologies in shaping United States history, students will have opportunities to practice and improve the following skills in this course:

- critical thinking (through reading and analyzing written documents and cultural sources, formulating arguments supported by historical evidence, and organizing information in a clear and logical manner)
- historical research (through finding information about historical topics in short assignments and an integrative essay)
- written communication (through writing short assignments, a film analysis, and an integrative essay)
- primary source analysis (through reading and identifying the key points, meaning, and significance of arguments and ideas presented in historical documents and cultural artifacts created during the time periods we are studying)
- secondary source analysis (through reading and identifying the key points, meaning, and significance of arguments and ideas presented in books and articles written by scholars about the time period we are studying)
- cultural text analysis (through thinking about the significance of cultural texts and material objects and placing them in historical context)
- oral expression (through small group and whole class discussions and student presentations)
- using the internet (through research assignments and guidance on how to evaluate internet sources)

Student Learning Outcomes (SLOs) and Correlation to Core Objectives (COs)

Students successfully completing this course will be able to:

1. connect science and technology from the period of the pre-Socratics to the age of Isaac Newton to social, commercial, religious, and economic problems and be able to distinguish sound scientific argumentation and the use of observational evidence as opposed to unsound scientific reasoning by means of engaging with the scientific debates of various periods. They will also be able to explain how scientific and technological discoveries and innovations affected social institutions, professional
roles, and education, and how scientific and technological knowledge was produced and consumed as part of social processes within various communities. Students will engage the subject by means of written compositions and oral communication within weekly discussions and assignments (CO1, CO3, CO9).

2. analyze and synthesize primary, secondary, and cultural sources (CO1, CO3, CO9)

3. present ideas in a clear and persuasive manner both orally and in writing, (CO1, CO3, CO9)

4. use historical evidence to analyze the experiences and cultural struggles of those articulating conceptually revolutionary ideas regarding the operation of nature and the body. (CO1, CO3, CO9)

Assessment for HIST 281R

Students will receive grades according to how well they complete the following tasks:

<table>
<thead>
<tr>
<th>Task</th>
<th>Percentage</th>
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<tr>
<td>Participation in discussions</td>
<td>25 percent</td>
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<tr>
<td>5 brief exams (in class)</td>
<td>25 percent</td>
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<tr>
<td>Integrative essay (5-10 pages)</td>
<td>25 percent</td>
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<tr>
<td>Primary source analysis (Galileo, <em>Sidereus Nuncius</em>) (5 pages)</td>
<td>25 percent</td>
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Class Participation (SLOs 1-4)

This course will be taught in a lecture/discussion format. Short lectures will provide historical background and explain key concepts, but much of your learning will occur through discussion of the assigned readings and other class activities. Therefore, regular attendance and participation are essential. If you are not present, you cannot participate, so excessive absences will lower your final grade. It is also very important that you complete the readings before the days they are assigned. Students who have not done the reading will find it hard to fulfill the class participation requirement, and this makes up a significant part of your grade.

You will not acquire the knowledge and skills you need to pass this course through passive reading or listening. Instead, you will need to take an active role in the learning process. This means working through the assigned texts carefully and critically, analyzing the information and not just summarizing it, and coming to class prepared to share your own thoughts and interpretations of the material.

Here is what you will need to do to be successful in this course. First, you will need to take good, consistent notes. I will try to help you in this regard by offering organized lectures, but the world does not always come to us in organized bundles and you will have to listen closely and organize our discussions and lectures for yourself. Second, you will have to read and think about assigned readings. All Assignments are to be completed in the weeks assigned and will be the basis for preliminary discussions each week. Doing both, you should have everything you need to write a well structured and informative essay each time.
**Brief Exams and assignments (SLOs 1 - 4)**

The brief exams and assignments are designed to encourage you to keep up with the reading and help you to prepare for class discussions and activities each week. In addition, the research and writing exercises required by the assignments provide opportunities to practice skills related to studying the history of science. Developing these skills through brief exams will help you to do well on the integrative essay required later in the course.

Although the brief exams will not be cumulative (i.e., they will only include material covered during the week when the quiz is given or the assignment is due), you may sometimes be asked to think back to things we looked at earlier in the semester and draw comparisons or make other connections to the current week’s material. This is another reason why regular attendance and paying close attention to lectures and discussions are essential.

**Integrative essay (1-4)**

Students will write a 5-10 page essay on one of the broad course themes, synthesizing material from the assigned readings, lectures, and discussions. Students may also incorporate other sources into this essay if they choose. The essay will include analysis of primary and secondary sources and present an argument in response to a historical question.

**Primary Source Analysis (1-4)**

Students will write a 5 page essay focused upon Galileo’s *Sidereus Nuncius* and will analyze the text from the point of view of the technological origins of the telescope and its social impact, the social and religious context of Galileo’s observations, and the role of art, rhetoric, and “disegno” in the construction of Galileo’s text.

**Grading Criteria**

**F (less than 60%)**
F is for work that is not acceptable. It demonstrates that the student has no idea what the course material is about, suggesting a lack of interest or effort and possibly some absences from class. Students who do the reading and come to class regularly rarely receive an F. If you think you have been trying hard and you get an F on an assignment, I encourage you to come to me for help.

**D– (60–62%), D (63–66%), D+ (67–69%)**
D is given for work that is inadequate. It omits important points, contains more than a few inaccuracies, and is badly organized. It suggests that the student has not been paying much attention to the course or is having problems understanding the material. As in the case of an F grade, if you think you have been trying hard and receive a D grade for a writing assignment, come and see me for help. I will do everything I can to assist students who want to work to improve their grades.
C– (70–72%), C (73–76%), C+ (77–79%)
C is given for work that is average. The student shows familiarity with the material and is mostly accurate, but the paper lacks detail or effective organization. The C essay might make general points but fail to support them with specific evidence, or it might be merely a collection of facts, with no coherent theme or thesis. You can pass the course with this kind of work, but you should aim higher.

B– (80–82%), B (83–86%), B+ (87–89%)
B denotes work that is above average in quality. It demonstrates that the student knows and understands the material covered in class, and that s/he is capable of synthesizing it into a competent essay. It is accurate, detailed, and well organized, with an introduction, a thesis, and a conclusion.

A– (90–94%), A (95–100%)
A is for work of exceptional quality. This grade is for essays that present a clear thesis supported by persuasive evidence and analysis, logically organized, and free from typing or grammatical errors. The A essay does more than just competently summarize material from the readings or lectures. It shows the student has thought things through on a deeper level and offers his or her own perspective on the topics under consideration.

Deadlines and Policies Regarding Missed Work
Assignments and essays are due in class on the dates indicated in the Weekly Schedule below. Late papers will be penalized (3 points deducted from your grade for the late assignment) unless you have contacted me before or on the due date to arrange an extension. There are ways to make up for points lost for late work or absences and to earn extra credit points to improve your grade.

Academic Dishonesty
I expect all students to do their own work in this course unless I have specifically assigned a group activity or project. Copying someone else’s work, or allowing your own work to be copied, is dishonest and unfair to other students who are striving to complete assignments and essays on their own.

The university's Academic Standards policy states:

Academic dishonesty is against university as well as the system community standards. Academic dishonesty includes, but is not limited to, the following:

Plagiarism: defined as submitting the language, ideas, thoughts or work of another as one’s own; or assisting in the act of plagiarism by allowing one’s work to be used in this fashion.

Cheating: defined as (1) obtaining or providing unauthorized information during an examination through verbal, visual or unauthorized use of books, notes, text and other materials; (2) obtaining or providing information concerning all or part of an examination prior to that examination; (3) taking an examination for another student, or arranging for another person to take an exam in one’s place; (4) altering or changing test answers after submittal for grading, grades after grades have been awarded, or other academic records once these are official. . . .
Sanctions for violations of university academic standards may include the following:

(1) filing a final grade of “F”; (2) reducing the student’s final course grade one or two full grade points; (3) awarding a failing mark on the test or paper in question; (4) requiring the student to retake the test or resubmit the paper.

Copying someone else’s entire paper or article is a clear example of academic dishonesty, but note that plagiarism can take other, less obvious forms as well. “Language, ideas, thoughts or work of another” includes any material used in your assignments and essays that was written or produced by others. Using brief phrases or sentences from books, articles, internet sites, documents, or other sources without letting your reader know where they came from is a form of plagiarism. You must properly acknowledge your use of other people’s words by placing them in quotation marks and citing all sources used in your paper. Even if you paraphrase someone else’s ideas and do not quote them directly, you must still indicate where those ideas came from. Citations should also be given for little-known facts and statistics.

Any student found violating academic standards in this course will receive a zero for the assignment in question. A second offense will result in an F in the course. In addition, all cases of academic dishonesty are reported to the Office of Student Conduct and become part of the student’s academic record. Potential employers as well as the directors of graduate and professional programs to which students may apply can request copies of these records, in which case the academic dishonesty charge will be disclosed.

**Academic Success Services**

Your student fees cover use of the Tutoring Center, the University Writing Center, and the Math Center. Students are encouraged to take advantage of these services as needed.

Tutoring Center: ph. 784-6801 or visit www.unr.edu/tutoring
University Writing Center: ph. 784-6030 or visit www.unr.edu/writing_center
Math Center: ph. 784-4433 or visit www.unr.edu/mathcenter

**Students with Disabilities**

The History Department is committed to equal opportunity in education for all students, including those with documented physical disabilities or documented learning disabilities. If you have a documented disability and will be requiring assistance, please contact me or the Disability Resource Center (Thompson Building Suite 101) as soon as possible to arrange for appropriate accommodations.

**Audio and Video Recording**

Surreptitious or covert videotaping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may be given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.
Required Texts

David Lindberg, *The Beginnings of Western Science*.
Richard Westfall, *The Construction of Modern Science* [chapters as handouts].

**WEEKLY SCHEDULE**

All Assignments are to be completed in the weeks assigned and will be the basis for preliminary discussions each week.

**Week 1:**
Introduction: Why a History of Science? The Pre-Socratics and the Identification of "what is."
Lloyd, 1-35

**Week 2:** (SLOs 1-4)
Plato and Natural Philosophy: Aristotle’s Natural Philosophy and the Concept of Motion
Lindberg, pp. 35-68; chapter 4  Lloyd, chapters 4, 6, 8.

**Week 3:** (SLOs 1-4)
Basic Elements of Observational Astronomy, the Celestial Sphere, and the Astronomy of the Greeks
Lindberg, chapter 5; Lloyd, chapter 7.
[Brief Exam 1]

**Week 4:** (SLOs 1-4)
Ptolemaic Astronomy and the Beginning of the Great Debate; Aristotle in the Early Middle Ages; the Cause of Motion and Criticism of Aristotle’s Theory of Motion.

**Week 5:** (SLOs 1-4)
Science and Society. The Medieval University and the Reception of Aristotle: Scientific Thinking and the Culture of Islam
Lindberg, chapters, 7, 8, 9.
[Brief Exam 2]

**Week 6:** (SLOs 1-4)
The Study of Medicine and Its Social Organization; Pharmacy, Alchemy, and the practices of distillation.
Lindberg, chapters 6 and 13; Lloyd, chapter 5.
Week 7: (SLOs 1-4)
The Quantification of Qualities: Kinematics and Medieval Optics
Lindberg, chapters 10, 11 and 12.
[Brief Exam 3]

Week 8: (SLOs 1-4)
Renaissance Humanism and Natural Magic; Paracelsus and Chemical Philosophy
Debus: Chapters 1, 2, 7.
[Integrative Essay Assigned: Discussion of Content and Organization]

Week 9: (SLOs 1-4)
The Advent of a Scientific Technology. Instrument building and the Ingenious Leonardo
Debus: Chapter 5
[Brief Exam 4]

Week 10: (SLOs 1-4)
The Discovery of New Worlds: Voyages, Navigation, and the Copernican Achievement
Debus: Chapters 3, 4

Week 11: (SLOs 1-4)
The Reception of the Copernican Theory; Tycho Brahe and the Real Revolution of Johannes Kepler
Debus: Chapter 6
[Brief Exam 5]
[Integrative Essay Due]

Week 12 (SLOs 1-4)
Galileo, Observation, and Method
begin Galileo: Sidereus Nuncius

Week 13 (SLOs 1-4)
The Galileo Affair: Science and Religion
finish Galileo: Sidereus Nuncius

Week 14 (SLOs 1-4)
New Method: Bacon, Descartes, and Mechanical Philosophy
Westfall: The Construction of Modern Science, Chapter 5: Biology and the mechanical Philosophy
[Primary Source Analysis Assigned: Discussion of Content and Organization]

Week 15 (SLOs 1-4)
Newton and the Foundations of Classical Physics
Westfall, The Construction of Modern Science, Chapter 8: Newtonian Dynamics

[Primary Source Analysis Due at Final Exam Meeting]