

SCI 599 – History of Science in the Western World Spring 2015

Instructor: Ron Gray, Ph.D.

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Credits: 3

Delivery: Hybrid (on campus and hybrid online)

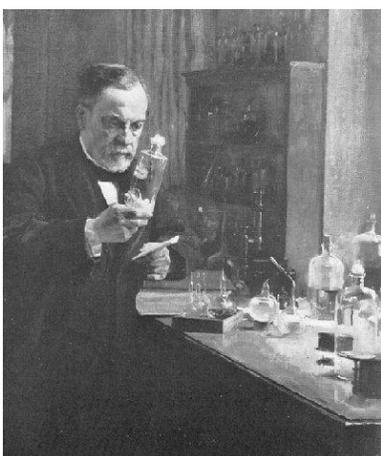
Format: Seminar

Phone: 928-523-3618

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Office hours: TBA

Prerequisites: None



It is a fact of life that oversimplified accounts of the development of science are often necessary in its teaching. Most scientific progress is a messy, complex and slow process; only with the hindsight of an overall understanding of a phenomenon can a story be told pedagogically rather than chronologically. This necessitates the distilling of certain events and personalities from the melee: those who are deemed to have made the most important contributions. It is inevitable therefore that the many smaller or less important advances scattered randomly across hundreds of years of scientific history tend to be swept up like autumn leaves into neat piles, on top of which sit larger-than-life personalities credited with taking a discipline forward in a single jump. Sometimes this is perfectly valid, and one cannot deny the genius of an Aristotle, a Newton, a Darwin or an Einstein. But it often leaves behind forgotten geniuses and unsung heroes.

- Jim Al-Khalili, *The House of Wisdom: How Arabic Science Saved Ancient Knowledge and Gave Us the Renaissance*

Required Texts

Bowler, P.J. & Morus, I.R. (2005). *Making modern science: A historical survey*. University of Chicago Press.

Frayn, M. (2000). *Copenhagen*. New York, New York. Anchor Books: Random House, Inc.

Shea, W.R. and Artigas, M. (2003). *Galileo in Rome: The rise and fall of a troublesome genius*. Oxford: Oxford University Press.

Additional readings will be provided

Course Description:

This course provides an overview of major episodes in the history of science from the scientific revolution of the seventeenth century through the present. Topics include recent historiographical approaches within the history of science along with noteworthy episodes in the history of biology, chemistry, physics, and the earth sciences. The course does not attempt to be definitive or exhaustive in its coverage of the history of science; it is not a celebration of great geniuses or theories. It is instead an attempt to pick out a handful of episodes that are judged to be particularly revealing about the way in which



the sciences have developed. Readings include a combination of primary and secondary sources.

Course Objectives:

By the end of the course, I expect that you will be able to:

- Compare and contrast major episodes in the history of science from the seventeenth century to modern day.
- Examine the history of science from multiple historiographical perspectives.
- Utilize multiple emergent themes across the history of science to tie together historical episodes from across the disciplines.
- Describe broadly the development of modern science from the scientific revolution through today.
- Utilize additional readings to facilitate an in-class discussion on a course topic.
- Conduct in-depth research on an aspect of the history of science that coincides with the course material.
- Practice professional patterns of communication including writing at a Master's level.

Requirements:

Requirements for the course include:

- **Participation.** Since this is a discussion-centered course, it is important for everyone in the course to be actively involved in the discussions and activities as well as to make significant contributions to the course.
- **Assignments.** All assignments must be turned in on or before their due date for full credit.
- **Readings.** The readings have been chosen to highlight the course topics. Without the readings, you will not be able to intelligently participate in the discussions.
- **Integrity.** You are responsible for making yourself aware of NAU Academic Regulations.

Final Project:

The final project for the course will challenge you to identify specific episodes in the history of science relevant to your current (or future) teaching assignment and to prepare materials to integrate those episodes into instruction. Specific sections of the final project include a) a case study for students; and b) an activity integrating content and history.

Facilitated Seminar Discussion:

Each week a pair of students will play an enhanced role in the seminar and do additional readings related to the topic. Roles may include

- Delivering a short (10-15 minute) summary of the course readings.
- Reading additional primary and secondary literature sources.
- Engaging the class in classroom activities based on the weekly topic.

Evaluation:

The grading system consists of 5 grades (A, B, C, D, and F). You will be evaluated in the following way:

- Weekly Participation 30%
- Facilitated Seminar Discussion 20%

- Midterm Exam 20%
- Final Project and Presentation 30%

Weekly Reading Schedule

Week	Topic	Assessment
1	Course introduction	
2	The historiography of science History in the classroom	
3	The scientific revolution	
4	The chemical revolution	
5	Galileo and the Church	
6	The conservation of energy	
7	The age of the Earth	Midterm exam
8	The Darwinian revolution	
9	The Darwinian revolution	
10	The new biology Genetics	
11	Ecology and environmentalism	
12	Revolutions in relativity and quantum mechanics	
13	Continental drift	
14	Revolutionizing cosmology	
15	Major themes in the history of science	
16	Finals project presentations	Final project

Core History of Science Journals in English:

- Isis, Osiris, and Isis Current Bibliography
- Annals of Science
- Ambix
- Boston Studies in the Philosophy of Science
- British Journal for the History of Science
- Bulletin of the History of Medicine
- Configurations: A Journal of Literature, Science & Technology
- Earth Sciences History
- Endeavour: Review of the Progress of Science
- Historical Studies of the Physical and Biological Sciences
- History and Philosophy of the Life Sciences
- History of Science
- Journal of the History of the Behavioral Sciences
- Journal of the History of Biology
- Minerva
- Perspectives on Science: Historical, Philosophical, Social
- Science in Context
- Social Studies of Science
- Studies in the History and Philosophy of Modern Physics
- Studies in the History and Philosophy of Science

- Technology and Culture

Other Basic Resources:

- Isis and Osiris. Q1. I7 and Q1. 078
- Isis Cumulative Bibliography (1986-1995 most recently), including journals listing. Z7405. H6 W51
- History of Science Society website: <http://www.hssonline.org>
- American Institute of Physics Center for History of Physics Website: <http://www.aip.org/history/>
- Chemical Heritage Foundation Website: <http://www.chemheritage.org>
- History of Science/Medicine/Technology Website: <http://www.h-net.msu.edu/~smt/>
- Charles C. Gillispie, ed. Dictionary of Scientific Biography. 16 volumes (Scribners, 1970-1981) followed by Supplement, ed. F. L. Holmes (1990). Q141.D5
- R. C. Olby et al., eds. Companion to the History of Modern Science (London: Routledge, 1990).
- S. Jasanoff, G.E. Markle, J. C. Petersen, and T. Pinch, eds. Handbook of Science and Technology Studies (Thousand Oaks, CA: Sage, 1995). Q158.5 H36 1995
- David C. Lindberg and Ronald L. Numbers, ed. The Cambridge History of Science, 8 vols. (Cambridge: Cambridge University Press, 2003-). V. 3. Early Modern Science, ed. Lorraine Daston and Katherine Park (2006), V. 4. Eighteenth-Century Science, ed. Roy Porter (2003). V. 5. The Modern Physical and Mathematical Sciences, ed. Mary Jo Nye (2003). V. 7. The Modern Social Sciences, ed. Theodore M. Porter and Dorothy Ross (2004). Q125. C32
- John L. Heilbron. The Oxford Companion to the History of Modern Science (Oxford: Oxford University Press, 2003).

Northern Arizona University Policy Statements

NAU's Safe Working and Learning Environment Policy prohibits sexual harassment and assault, and discrimination and harassment on the basis of sex, race, color, age, national origin, religion, sexual orientation, gender identity, disability, or veteran status by anyone at this university. Retaliation of any kind as a result of making a complaint under the policy or participating in an investigation is also prohibited. The Director of the Office of Affirmative Action & Equal Opportunity (AA/EO) serves as the university's compliance officer for affirmative action, civil rights, and Title IX, and is the ADA/504 Coordinator. AA/EO also assists with religious accommodations. You may obtain a copy of this policy from the college dean's office or from the NAU's Affirmative Action website nau.edu/diversity/. If you have questions or concerns about this policy, it is important that you contact the departmental chair, dean's office, the Office of Student Life (928-523-5181), or NAU's Office of Affirmative Action (928) 523- 3312 (voice), (928) 523-9977 (fax), (928) 523-1006 (TTD) or aaeo@nau.edu.

Students with disabilities

If you have a documented disability, you can arrange for accommodations by contacting Disability Resources (DR) at 523-8773 (voice) or 523-6906 (TTY), dr@nau.edu (e-mail) or 928-523-8747 (fax). Students needing academic accommodations are required to register with DR and provide required disability related documentation. Although you may request an accommodation at any time, in order for DR to best meet your individual



needs, you are urged to register and submit necessary documentation (www.nau.edu/dr) 8 weeks prior to the time you wish to receive accommodations. DR is strongly committed to the needs of student with disabilities and the promotion of Universal Design. Concerns or questions related to the accessibility of programs and facilities at NAU may be brought to the attention of DR or the Office of Affirmative Action and Equal Opportunity (523-3312).

Academic contact hour policy

Based on the Arizona Board of Regents Academic Contact Hour Policy (ABOR Handbook, 2-224), for every unit of credit, a student should expect, on average, to do a minimum of three hours of work per week, including but not limited to class time, preparation, homework, studying.

Academic integrity

Integrity is expected of every member of the NAU community in all academic undertakings. Integrity entails a firm adherence to a set of values, and the values most essential to an academic community are grounded in honesty with respect to all intellectual efforts of oneself and others. Academic integrity is expected not only in formal coursework situations, but in all University relationships and interactions connected to the educational process, including the use of University resources. An NAU student's submission of work is an implicit declaration that the work is the student's own. All outside assistance should be acknowledged, and the student's academic contribution truthfully reported at all times. In addition, NAU students have a right to expect academic integrity from each of their peers.

Individual students and faculty members are responsible for identifying potential violations of the university's academic integrity policy. Instances of potential violations are adjudicated using the process found in the university [Academic Integrity Policy](#).

Research integrity

The Responsible Conduct of Research policy is intended to ensure that NAU personnel including NAU students engaged in research are adequately trained in the basic principles of ethics in research. Additionally, this policy assists NAU in meeting the RCR training and compliance requirements of the National Science Foundation (NSF)-The America COMPETES Act (Creating Opportunities to Meaningfully Promote Excellence in Technology, Education and Science); 42 U.S.C 18620-1, Section 7009, and the National Institutes of Health (NIH) policy on the instruction of the RCR (NOT-OD-10-019; "Update on the Requirement for Instruction in the Responsible Conduct of Research"). For more information on the policy and the training activities required for personnel and students conducting research, at NAU, visit:

<http://nau.edu/Research/Compliance/Research-Integrity/>

Sensitive course materials

University education aims to expand student understanding and awareness. Thus, it necessarily involves engagement with a wide range of information, ideas, and creative representations. In the course of college studies, students can expect to encounter—and critically appraise—materials that may differ from and perhaps challenge familiar understandings, ideas, and beliefs. Students are encouraged to discuss these matters with faculty.

Classroom disruption policy

Membership in the academic community places a special obligation on all participants to preserve an atmosphere conducive to a safe and positive learning environment. Part of that obligation implies the responsibility of each member of the NAU community to maintain an environment in which the behavior of any individual is not disruptive. Instructors have the authority and the responsibility to manage their classes in accordance with University regulations. Instructors have the right and obligation to confront disruptive behavior thereby promoting and enforcing standards of behavior necessary for maintaining an atmosphere conducive to teaching and learning. Instructors are responsible for establishing, communicating, and enforcing reasonable expectations and rules of classroom behavior. These expectations are to be communicated to students in the syllabus and in class discussions and activities at the outset of the course. Each student is responsible for behaving in a manner that supports a positive learning environment and that does not interrupt nor disrupt the delivery of education by instructors or receipt of education by students, within or outside a class. The complete classroom disruption policy is in Appendices of [NAU's Student Handbook](#).