

HISTORY OF SCIENCE: ANTIQUITY TO 1700

HIS 271 F (UH code: HIS 394)

Fall 2021

Day/Time: TBA

Credit hours: 3

Contact hours: 45

Additional costs: approx. 9 Euro (details at point 10)

Prof. Veronica Bindi

Teacher availability/contact: available to meet individually right after class or by appointment via mail bindi@hawaii.edu

1 - DESCRIPTION

This course examines key episodes and themes in the history of science up to the 17th century. Students will learn to situate scientific ideas within their social, cultural, and broader intellectual contexts. We will survey a range of scientific developments, treating science both as a body of knowledge and as a set of practices, and moving across centuries, continents, and disciplines to see how what we know about the natural world is tied to the who, when, where, and how's of knowledge production and circulation. To understand how modern scientific practices emerged, we will examine the changing nature of scientific inquiry and methodology, the importance of social supports and institutions for scientists, and the growing cultural importance of science in society. The main topics of this course are: 1. the emphases that civilizations have placed on either theoretical science or practical technology; 2. the effect of culture on the questions that science asks; 3. the relationship between science, religion and cultural believes.

2 - OBJECTIVES, GOALS and OUTCOMES

By the end of the semester, as a result of the material covered in this course, field trips, and lectures by guest speakers, students will acquire:

1. An understanding of what it means to think historically: locating subjects in time and place and being sensitive to the contingencies of context and how this changes over time;
2. The ability to identify different types of sources of historical knowledge including the ability to use library and digital resources to identify and use relevant sources;
3. Critical and creative thinking; the ability to ask and answer a good research question;
4. A general understanding of the study of history of science, and technology in context;
5. An ability to work independently and cooperatively in a team, to synthesize information from a range of primary sources and explain this information effectively in written and oral form.

3 - PREREQUISITES

This is an introductory course and, therefore, no previous knowledge is required. This course is taught in English.

4 - METHOD

Classroom activities will be a combination of: slides and short videos related to lectures, field trips and guest speakers (a specialist in theology and popular culture, a specialist in gender and diversity studies) to contribute a better understanding of the major topics followed by active involvement and discussion in class. An open project will be assigned to each student to be presented and discussed in class.

5 - ASSESSMENT

Throughout the course, students will be assessed as follows:

1. Exams - two written test exams will be given (1 midterm and 1 final).
2. Witten essay - for description see section 5.1 below
3. Participation in class including outside visits is part of the evaluation.

Once the course is defined, please consider that all scheduled tasks and given dates and deadlines must be respected, so please organize your personal schedule accordingly.

5.1 - WRITTEN ESSAY and ORAL PRESENTATION

Essay:

- shows your thinking.
- extends beyond class discussion and resolves problems we raise.

- shows what you have learned.

An ideal essay:

- is concise (min of 4 pages, max 8 pages), while expressing substantive ideas.
- may be informal in tone, but communicates clearly.
- reflects thoughtful consideration of the issue(s) behind the writing.
- uses several **concrete and specific examples** (or one extended example) linked to a general theme.

Topics: a list of topics relevant to the course will be provided in class

Sources: You will be expected to use different kinds of source material and to develop an argument. You are expected to use at least SIX sources, including books, journal articles, online-journals and primary source material. At least ONE of the sources should be a primary source, at least ONE a book and at least ONE a journal article. Be judicious in the use of Web resources. Wikipedia, Sparknotes, Encarta and similar sites DO NOT count as acceptable sources.

Deadline and submission: When submitting work via email, please label your file with your last name.

The essay should be submitted by April 26, 2016

Note: late submissions of assignments, including papers, are **not accepted**. If an assignment is submitted after the deadline, the grade for the assignment will be an F = 0 points, which may adversely impact the final course grade.

Oral presentation: The time allocated to each oral presentation is 12 min + a few minutes for questions. Slides need to be presented in a clear way in front of all the class. **The presentation in class will be done in April 26, 2016.**

6 - EXAMS

Two written exams given, 1 midterm and 1 final, consisting of multiple choice and short answer questions. The dates of the exams cannot be changed for any reason, so please organize your personal schedule accordingly.

7 - EVALUATION and GRADING SYSTEM

15% Participation

25% Mid-term exam

30% = 15% Written Essay + 15% Oral presentation

30% Final exam

The following grading system will be observed:

A = 100 - 93, **A-** = 92 - 90, **B+** = 89 - 87, **B** = 86 - 83, **B-** = 82 - 80,

C+ = 79 - 77, **C** = 76 - 73, **C-** = 72 - 70, **D** = 69 - 60, **F** = 59 - 0

8 - ATTENDANCE and BEHAVIOR

Mandatory attendance is a primary requirement for a responsible learning experience at LdM. Please note that:

- If the student misses **THREE** classes, the **Final grade** will be lowered by one full letter grade.
- If more than **FOUR** classes are missed, the final grade will be an **"F"** and **NO credits** will be given for this course.

Punctuality is mandatory. Students must arrive in class on time:

- Any lateness, leaving class during the lesson without notice, not showing up on time after the break, or leaving earlier, will impact the participation grade and the Final Grade. In addition:
- Three late arrivals or the equivalent (10 to 20 minutes) result in one absence in the attendance count.
- Missing more than 20 minutes will be considered as one full absence.

It is the responsibility of the student to **catch up on any missed work** and to **keep track of his or her absences** and cases of tardiness.

Missed in-class activities cannot be made up. Be informed in advance about how to submit assignments in the case of absence.

Make-up classes are always mandatory since they are part of the course program.

Scheduling conflicts: if on occasion a class creates a scheduling conflict with another class (due to a clashing make-up, class trip, etc.), the student is **required to inform both instructors IN ADVANCE**, allow-

ing the two instructors to share a written excuse for the class going to be missed. Even though an absence may be excused, students must be aware that there will be **no possibility** to make up any assessed in-class activities they may have missed and **no refund** can be given for pre-paid visit/field trip fees. Keep this in mind in order to make a responsible decision about which class to attend.

Classes with visits are considered regular classes in all respects: The same absence or lateness rules will be applied as for lessons that meet in class, without excuses.

All students are requested to **be 5 to 10 minutes early** at the meeting point, so that the class can promptly enter at the specified entry time. If a student is late, **the class cannot wait** for him/her and the student will be responsible for paying for his/her entry.

Please be aware of any **changes** to visit location/time/day; get to know the meeting point and any relevant details before the class.

Behavior / Academic Dishonesty:

Active and responsible participation is insisted on. Students are required to **behave** properly within the school premises and during class.

Proper behavior and **dress code** must be observed in class and during out-of-class sessions. For example, no food or drinking is allowed in museums; in religious places, shoulders and knees must be covered.

Classrooms are to be left **orderly and clean**. Students must take proper **care** of available equipment and materials and promptly report any damage and loss.

Drinking/eating during class is not allowed. **Electronic devices (cell phones, Blackberry, iPod, laptop computers, etc.) must be switched off** during class, unless otherwise instructed.

Instructors who find that a student's behavior is inappropriate will seek to talk with him/her promptly; if the issue continues, the instructor is required to contact the pertinent LdM authority.

Should issues of academic dishonesty arise, the faculty member will adhere to the relevant LdM policy and report suspected instances to the LdM Dean of Students for disciplinary review. According to the LdM Rules of Conduct, "Violations include cheating on tests, plagiarism, inadequate citation, recycled work, unauthorized assistance, or similar actions not explicitly mentioned".

Assignments and projects are specific to individual courses; presenting the same work in two different courses (including previous courses) is considered recycling and is unacceptable.

Students with **learning disabilities** are required to contact their LdM Advisor or LdM Dean of Students.

9 - READINGS & SOURCES

Mandatory Readings:

1. Textbook: ebook *A short history of science to the nineteenth century* by C. Singer (1941).
2. Course pack: slides shown in class will be provided online as reference. Articles about specific topics covered in class will also be made available.

Indicative additional bibliography for one topic, female scientists in and since antiquity:

- Alic, M. (1986). *Hypatia's Heritage: A history of women in science from Antiquity through the Nineteenth Century*. Boston, MA: Beacon Press.
- Asimov, I. (1972). *Asimov's biographical encyclopedia of science and technology: The lives and achievements of 1195 great scientists from ancient times to the present chronologically arranged*. New York, NY: Avon Books.
- Deakin, A.B. (2007). *Hypatia of Alexandria: mathematician and martyr*. Amherst, NY: Prometheus Books.
- Herzenberg, C.L., Meschel, S.V., & Altena, J.A. (Feb. 1991). Women scientists and physicians of antiquity and the Middle Ages. *Journal of Chemical Education*, 68(2). DOI: 10.1021/ed068p101.
- Ogilvie, M. B. (1986). *Women in science: Antiquity through the Nineteenth Century*. Cambridge, Mass.: Massachusetts Institute of Technology Press.
- Wellman, M. (2005). *Hypatia, or, the divine algebra*. Alexandria, VA: Alexander Street Press.

Indicative general science history bibliography:

- Barnes, J. (Ed.) (1995). *The Cambridge companion to Aristotle*. Cambridge [England]: Cambridge University Press.
- Biagioli, M. (1993). *Galileo, courtier: The practice of science in the culture of absolutism*. Chicago: University of Chicago Press.
- Boas Hall, M. (1962) *The Scientific Renaissance 1450-1630*. New York: Dover
- Clarke, B., Rossini, M. (eds.) (2011). *The Routledge companion to literature and science*. London: Routledge.

- Crombie, A. C. (1959). *Medieval and early modern science*. Garden City, N.Y: Doubleday.
- Crowe, M.J. (1990). *Theories of the world from Antiquity to the Copernican Revolution*. New York: Dover, 1990.
- Dear, P. (2001). *Revolutionizing the sciences: European knowledge and its ambitions, 1500-1700*. Princeton: Princeton University Press.
- Debus, A.G. (1978). *Man and nature in the Renaissance*. Cambridge: Cambridge University Press
- Descartes, R., & Gaukroger, S. (1998). *The world and other writings*. Cambridge [England]: Cambridge University Press.
- Drake, S., Swerdlow, N. M., & Levere, T. H. (1999). *Essays on Galileo and the history and philosophy of science*. Toronto: University of Toronto Press.
- Freedberg, D. (2002). *The eye of the lynx: Galileo, his friends and the beginnings of modern natural history*. Chicago: The University of Chicago Press.
- Gingerich, O. (2004). *The book nobody read: Chasing the revolutions of Nicolaus Copernicus*. New York: Walker & Company.
- Saliba, G. (2007). *Islamic science and the making of the European Renaissance*. Cambridge, Mass.: MIT Press.
- Gregory, F. 2008. *Natural Science in Western History*. Boston: Houghton Mifflin.
- Hankins, J. (Ed.) (2007). *The Cambridge companion to Renaissance philosophy*. Cambridge [England]: Cambridge University Press.
- Heilbron, J. L. (2010). *Galileo*. Oxford: Oxford University Press.
- Kepler, J., & Donahue, W. H. (2004). *Selections from Kepler's Astronomia nova*. Santa Fe, N.M: Green Lion Press.
- Maurice Galilei, G., & Finocchiaro, M. A. (2008). *The essential Galileo*. Indianapolis, Ind: Hackett Pub. Co.
- Lindberg, D. C., & International Society for Science and Religion. (2008). *The beginnings of western science: The European scientific tradition in philosophical, religious, and institutional context, prehistory to A.D. 1450*. Cambridge [England]: International Society for Science and Religion.
- Machamer, P. (ed.) (1988). *The Cambridge companion to Galileo*. Cambridge [England]: Cambridge University Press
- Osler, M.J. (2010). *Reconfiguring the World: Nature, God and Human Understanding, from the Middle Ages to Early Modern Europe*. Baltimore, MD: The Johns Hopkins University Press.
- Pedersen, O. (1993). *Early Physics and Astronomy*. Cambridge: Cambridge University Press 1993.
- Principe, L. (2011) *The Scientific Revolution: A very short introduction*. Oxford: Oxford University Press, 2011
- Roger, J., & Benson, K. R. (1997). *The life sciences in eighteenth-century French thought*. Stanford, Calif: Stanford University Press.
- Rossi, P. (2001). *The birth of modern science in Europe*. Malden, Mass: Blackwell.
- Russo, L., & Santoni, E. (2010). *Ingegneria minuti. Una storia della scienza in Italia*. Milan: Feltrinelli, 2010
- Siraisi, N.G. (1990). *Medieval & early Renaissance medicine: an introduction to knowledge and practice*. Chicago: The University of Chicago Press, 1990.
- Westfall, R.S. (1980). *Never at rest: A biography of Isaac Newton*. Cambridge [England]: Cambridge University Press, 1980.
- Wilkins, J. S. (2009). *Defining species: A sourcebook from antiquity to today*. New York: P. Lang.

Consult instructor for further bibliography.

Additional Optional Readings:

<http://ldm2.kohalibrary.com/cgi-bin/koha/opac-search.pl>

Online Resources:

- 1) Museo Galileo (Florence, Italy)
<http://www.museogalileo.it/en/index.html>
- 2) The Galileo Project <http://galileo.rice.edu/index.html>
- 3) Interdisciplinary Documentation on Religion and Science
<http://www.disf.org/en/>

Please consult instructor for information about further resources.

10 - ADDITIONAL COSTS

Through the course students must expect to spend approx. 9 Euro as follows:
Tot. 9 Euro (approx.) for visit to Galileo Museum (details at point 11)

11 - VISITS and TRIPS

The following visit is planned (see point 13A for dates and details):

1) Galileo Museum <http://www.museogalileo.it/en/index.html> (requires 9 Euro entry fee)

NOTE:

- Given that field trips to museums, galleries and to churches are always pertinent and fundamental for the course, they must be considered mandatory and count as regular attendance. They usually take place during regular class time, unless specified differently, due to specific time schedules.
- These field trips require students to pay regular entry.
- LdM and its faculty do the best to get free or reduced entrance for visits that are part of academic courses. However, the state museums in Florence don't grant free or reduced admission. Students will be responsible of paying any required entry fee, including additional class reservation fee when required. Acquisition of any type of museum membership or city discount card is entirely up to the individual student. Any problems with entry fees in connection with personal membership cards can't be resolved by the professor.
- Make sure you know the exact meeting point each week and how to get there; be aware that there might be changes in the field trip schedule!
- Please don't be late at the meeting point as the class cannot wait for you to enter the museum at the reserved time.
- If you have been absent, please find out what to do and where to meet for the next lesson.
- A late arrival will be treated as an absence.
- Ticket costs are subject to change, and may be higher for some museums if a special exhibition is on show.

12 - MATERIALS

Not applicable.

13A- CLASS SCHEDULE

Contents of individual classes may be changed throughout the course according to the class's progress. Please remember that some visits may be rescheduled, and that additional visits -whenever available and pertinent- may be included within regular class time.

1) Sept X	Presentation of the course; introduction to the class syllabus and course reader. Information on assignments and visits. Student introductions. Presentation about my research work: "What are cosmic rays and how and why do we study them". Michio Kaku's video about physics.
2) Sept X	Ancient Babylonian, Greek and Roman science. Atom Cartography Study on the Earth's shape
3) Sept XX	Leonardo da Vinci (Guest lecture)
4) Sept XX	Science in the European Middle Ages in the Renaissance, and in the Arts. Copernicus, Galileo Galilei and the Scientific Revolution.
5) Oct X	Visit to Galileo Museum.
6) Oct X	The Newtonian synthesis. Lights and colors. Baroque
7) Oct XX	MIDTERM
	MIDTERM BREAK
8) Oct XX	Science, popular culture and religion (Guest speaker).
9) Nov X	Women condition in ancient times. Women in science.
10) Nov X	Visit of Florence churches and locations with historical connections with what discussed in the lectures.
11) Nov XX	Individual Project presentations and open discussion. Deadline for submission of the written essay.
12) Nov XX	A very short lecture on Modern science - Computer and A. Turing. Science and diversity.
13) Dec X	Movie. Preparation for the final.
14) Dec X	FINAL EXAM

13B- ALTERNATIVE LESSON

Should the instructor be unavailable, a substitute teacher will hold class as scheduled (topic may vary).