History 180
Western Science and Technology I:
From the Greeks to the Scientific Revolution

University of Massachusetts Amherst
Fall Semester 2002
Lecture: Tues. & Thurs., 10:10-11 AM, Tobin 304 (schedule #521717)
Discussion sections:
  - Friday, 9:05, Herter 108 (schedule #521724)
  - Friday, 11:15, Herter 222 (schedule #521731)
  - Friday, 12:20, Herter 110 (schedule #521738)
Course website: <http://www-unix.oit.umass.edu/~ogilvie/180/>

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Brief description of course
Science and technology are important aspects of the modern world. Where did they start? How
did they develop? This course approaches the history of science and technology in the Western
world by focusing on four developments: (1) the agricultural revolution in the Neolithic Era and
its consequences, including the rise of urban societies in the ancient Near East; (2) the origins
and development of Greek natural philosophy, seen as a part of Greek culture and society; (3)
the technological revolution of the High Middle Ages in Europe, including the development of
more efficient agriculture and the exploitation of animal, water, and wind power; and (4) the
so-called “Scientific Revolution” of the sixteenth and seventeenth centuries. Though our
emphasis is on the Western tradition, we will also compare developments in Europe with those
in other world civilizations.

Because this course is a general education course, it has been designed with a
fundamental principle of liberal arts education in mind: you don’t truly know something unless
you can explain why and how you know it—that is, unless you can justify your claim to
knowledge. This course will introduce you to how historians investigate the past; our
explorations in the history of science and technology will also illuminate the problems and
methods of historical inquiry. The past is present to us only through the artifacts that have
survived and the traces left by what has happened on the world as we experience it. Historians
reconstruct the past by uncovering and interpreting these artifacts and traces—not only texts,
though they are crucial historical evidence, but also physical objects, aerial photographs, and
even human customs.

Lecture and discussion. Evaluation will be based on quizzes, participation, exams, and a
written report.

The course has no prerequisites, though a background in western civilization is helpful.
The suggested readings on the course web site include a few general histories that you might
find useful if you haven’t taken a western civ course.
Course goals
At the end of the semester, you should be able to:

- Explain the main developments of Western science and technology from ancient Greece through the seventeenth century.
- Explain how scientific ideas and technological developments are affected by the culture and society in which they developed.
- Explain how scientific ideas and technological developments have changed the culture and society in which they developed.
- Discuss the changing relationship between science and technology in the Western tradition.
- Understand scientific and technical ideas in their contexts, as well as how they compare with modern concepts of science and technology.
- Understand how historians approach the past and what tools and resources they use when reconstructing the history of science and technology.

Your goals for the course
You have just read my goals for the course. You should now take the time to reflect on those goals and think about any others you might have. In the space below, you can write the reasons you are in this course and any goals on which you wish to concentrate during it.

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Books for course
The following required books have been ordered through Atticus Books (8 Main Street, Amherst, tel. 256-1547). They are also on reserve in the DuBois Library. I have given ISBN numbers in case you want to order them yourself; I encourage you to support local businesses.

Note: Bookstores begin to return unsold books around the beginning of November, so be sure to buy them while they’re still available.

Suggestions for additional reading are available on the course web site.


Course requirements and grading

This course is an introductory survey. It has no prerequisites and requires no background in history or science. Some of the readings are difficult, but they will be explained so that everyone can understand them, and discussions will help you deepen your understanding. But the course is not easy. You will need to consistently do the readings and attend class regularly in order to pass. To succeed in this class, you should plan to spend four to six hours every week reading and studying. Some weeks won’t require that much; other weeks may require a little more.

The requirements and grading are as follows:

1. Attendance and participation in discussions (15% of final grade)
   Attendance will be taken in discussion, and every absence beyond the second will be penalized by a reduction of one point (out of 15 maximum) in the attendance and participation component of the grade. Exceptions will be made only for religious holidays, university-approved absences (e.g. athletic or musical events), and other University-approved absences (see Undergraduate Rights and Responsibilities for a list).

2. Quizzes in lecture (15% of final grade)
   There will be a short quiz at the beginning of each lecture. The quizzes should be easy if you have done the assigned reading. Each quiz will be worth three points: one for taking the quiz (i.e. attendance) and two for getting the right answer (Woody Allen once said that “Eighty percent of success is showing up”; he may have been wrong about the percentage, but he had a point!). You can miss up to five quizzes with no penalty; if you miss fewer than five, the “extra” quizzes will count as extra credit. This is the only extra credit in the course, and it can raise your final course grade a maximum of one-half letter grade!

3. Three examinations (50% of final grade)
   There will be two in-class examinations, on Tuesday, October 8, and Thursday, November 7, and a final examination during the exam period. The in-class examinations will be 50 minutes long and will comprise short answers and one essay question each. The comprehensive final examination will be 120 minutes long and will comprise short answers and two essay questions. You will receive study guides for each examination.

4. Report (20% of final grade)
   This assignment will be due Tuesday, December 3. It will be distributed well in advance. There will be several possibilities for this assignment, ranging from a traditional expository paper to recreating scientific observations made by past scientists (for instance, building and using a Galilean telescope).

Index cards

Please bring several 3x5 index cards to each class meeting (including discussion sections). You will use them to write your answers to quizzes and for informal, ungraded assessment activities. A pack of 100 index cards will be enough for the semester.

Course structure

Lectures, by Prof. Ogilvie, take place on Tuesdays and Thursdays. Discussion sections, led by Mr. Eisner, will be held on Fridays. Both lectures and discussions are crucial parts of the course, and attendance at both is expected. Reading necessary to understand the lectures will be assigned in conjunction with that lecture, but all the readings for a week will be discussed on Fridays. If you fall behind in the readings during the week, you should catch up by Friday in order to be prepared for discussion.
A note on readings

In addition to the required books, there will be a few handouts and one required reading on reserve. Most handouts are listed below, but there may be a few others over the course of the semester. They will be short.

There are several kinds of reading for this course. The textbook, McClellan and Dorn’s *Science and technology in world history*, provides a basic narrative of the development of science and technology that presumes no background. Daniel Boorstin’s *The discoverers* is a thematic account of aspects of science. White’s *Medieval technology and social change* is a more focused study of the impact of technology on society. All these books are *secondary sources*: works written after the events they describe, on the basis of contemporary evidence and other secondary sources. The remaining books, by Aristotle, Bacon, and Galileo, are *primary sources*: documents written at the time which provide the evidence that historians use to reconstruct the past. They will be harder to read, because they were written for contemporaries, not for modern readers. I hope you will also find them more rewarding in the end.

Course schedule with topics, readings, and assignments

Thurs. 9/5: Introduction to the course. What is science? What is technology?

Fri. 9/6: Discussion: what is the history of science and technology?

Read: handout from Thursday.

Thurs. 9/10: History and the discovery of prehistory

Read: Boorstin, 574-624 (chapters 71-76). If you have time, read pp. 558-574 first.

Thurs. 9/12: Handy man—and woman: human origins, agriculture, and technology

Read: McClellan/Dorn, 1-30 (introduction, chapters 1 & 2).

Fri. 9/13: Discussion

Tues. 9/17: Agricultural hydraulics: The foundation of civilization

Read: McClellan/Dorn, 31-54 (chapter 3).

Thurs. 9/19: Writing, technology, and the social order

Fri. 9/20: Discussion

REMINDER: If you will be absent for religious holidays, athletic competitions, or other university-approved reasons, you must present a list of dates you will be gone to both Prof. Ogilvie and Mr. Eisner by today, in writing (e-mail or hard copy).

Tues. 9/24: Greek science, technology, and society

Read: McClellan/Dorn, 55-95 (chapter 4).
Thurs. 9/26: Greek scientific method

Read: Aristotle, 16-30, 196-216, 275-282 (selections from Posterior Analytics, Nicomachean Ethics)

Fri. 9/27: Discussion

Tues. 10/1: Aristotle’s physics and the Greek cosmos

Read: Aristotle, 36-75, 187-194 (selections from Physics; Generation and Corruption; Metaphysics, book 12).

Thurs. 10/3: Aristotle’s biology and psychology

Read: Aristotle, 76-114 (selections from De Anima, Parts of Animals).

Fri. 10/4: Discussion

Tues. 10/8: EXAM I

Thurs. 10/10: Knights and monks: Europe in the early Middle Ages

Read: White, to p. 38 (preface and chapter 1).

Fri. 10/11: Discussion

Tues. 10/15: The medieval agrarian revolution

Read: White, 39-78 (chapter 2).

Thurs. 10/17: The revitalization of Europe

Read: McClellan/Dorn, 175-201 (chapter 9); White, 79-134 (chapter 3).

Fri. 10/18: Discussion

Tues. 10/22: Marking time

Read: Boorstin, 3-53 (chapters 1-6).

Thurs. 10/24: Europe and China

Read: Boorstin, 56-78 (chapters 7-9); McClellan/Dorn, 117-140 (chapter 6).
Fri. 10/25: Discussion

REMINDER: The mid-semester date is Monday, October 28. Prof. Ogilvie will leave Amherst on Thursday, October 24, and will not be back until Tuesday, October 29. If you need to withdraw from the course, please see him this week.

Tues. 10/29: Europe and the East

Read: Boorstin, 82-143 (chapters 10-19). Read pp. 82-113 quickly; focus your attention on the later chapters.

Thurs. 10/31: Europe’s ocean-borne expansion

Read: Boorstin, 146-178, 217-223, 244-278 (chapters 20-23, 29, 33-36). If you are not familiar with the story of Columbus’s “discovery” of America, also read pp. 224-244.

Fri. 11/1: Discussion

Tues. 11/5: Science in the Islamic world

Read: Boorstin, 178-201 (chapters 24-26); McClellan/Dorn, 99-115 (chapter 5).

Thurs. 11/7: EXAM II

Fri. 11/8: No discussion section today

Tues. 11/12: Revolution in astronomy: Copernicus to Kepler

Read: McClellan/Dorn, 203-221 (chapter 10); Boorstin, 294-312 (chapters 38-39).

Thurs. 11/14: Galileo’s astronomy

Read: McClellan/Dorn, 223-234 (part of chapter 11); Boorstin, 312-322 (chapter 40); Galileo, 21-58.

Fri. 11/15: Discussion

Tues. 11/19: Galileo and the Church

Read: Boorstin, 322-327 (chapter 41); Galileo, 173-216.

Thurs. 11/21: Printing and the dissemination of knowledge

Read: Boorstin, 480-538 (chapters 60-66).

Fri. 11/22: Discussion
Tues. 11/26: The discovery of the human body

Read: Boorstin, 338-383 (chapters 44-49); review Aristotle, 76-114 (selections from De Anima, Parts of Animals).

Thurs. 11/28 and Fri. 11/29: NO CLASS (Thanksgiving recess)

Tues. 12/3: Calls for a New Science

Read: Bacon, 1-33 (The Great Instauration).

REMINDER: Your report is due today at the beginning of class.

Thurs. 12/5: Galileo: The New Sciences and the New Science

Read: McClellan/Dorn, 234-247 (rest of chapter 11); Galileo, Discoveries and opinions, 229-280.

Fri. 12/6: Discussion

Tues. 12/10: The New Science: Courts, academies, circles, societies

Read: Bacon, pp. 35-83 (The New Atlantis).

Thurs. 12/12: Was there a Scientific Revolution? Why does it matter?

Read: Boorstin, 386-417 (chapters 50-53); McClellan/Dorn, pp. 249-273 (chapter 12).

Fri. 12/13: Discussion

Exam week: EXAM III (comprehensive final)
The small print

Policy on Absences
If you will be absent from class for a religious holiday, athletic or musical event, or any other university-approved reason, you must give a list in writing (paper or e-mail) to both Prof. Ogilvie and Mr. Eisner by Friday, Sept. 20.

Policy on Late or Missed Assignments
Quizzes: You cannot make up quizzes, but you can miss five (about 20%) with no penalty. If you miss more than five classes for University-approved reasons (ill health, religious holidays, or University-related travel, for example), you may make up the additional missed quizzes. As noted above, if you miss fewer than five quizzes, the “extra” quizzes will count as extra credit.

Exams: If you must miss an exam, you should arrange beforehand with Prof. Ogilvie or Mr. Eisner to take a makeup at a mutually acceptable time (within a week of the scheduled exam). If you miss an exam without permission, you can make it up for half credit (your exam grade will be divided in half when the final course grade is calculated).

Report: The maximum grade on the report will be reduced by one-half letter grade for each working day it is late. Exceptions will be made only in the case of bona fide emergencies.

Policy on Classroom Conduct
If you are to learn effectively, the classroom has to be free of distractions that might get in the way of your learning. The following rules are intended to make sure that everyone can learn as effectively as possible. They apply to both lecture and discussion sections.
• Try to be prompt. If you come in late, you distract the instructor and the other students. If you must be late, please be quiet when you come in.
• Don’t leave early unless you must, and don’t pack your bag until class is over.
• Turn off your cell phone in class. If you are a volunteer firefighter, an expectant father, or someone else with a good reason for having a phone turned on, please see Prof. Ogilvie, who will make an exception.
• Don’t read the newspaper during class. It distracts students around you and can block the vision of those behind you.
• Don’t talk in class about extraneous matters. If you have something to say about the course material during lecture, please tell Prof. Ogilvie, who will be happy to listen.
• University rules prohibit eating and drinking in the classroom; if eating or drinking becomes a distraction to other students, the instructor will have to enforce the rule.

Policy on Academic Honesty
Plagiarism and cheating on the exams are both grounds for failure in the course. Plagiarism consists of either (a) copying the exact words of another work without both enclosing them in quotation marks and providing a reference, or (b) using information or ideas from another work without providing credit, in notes, to the source of the information or ideas. Submission of a paper copied from another work, or which contains fictitious or falsified notes, will result in automatic failure of the course. Please refer to the Undergraduate Rights and Responsibilities booklet for the University’s full policy on academic honesty.

Cheating on the exams includes, but is not limited to, copying from another student during the exam. It is not cheating to discuss material with classmates beforehand—indeed, I encourage it. However, that kind of collaboration should stop when the exam begins.
Tips for success

History 180 is not an easy course, but if you keep a few simple points in mind, it will be a lot easier. Here are some tips for doing well in the course. They all are really aspects of one overarching principle: TAKE RESPONSIBILITY FOR YOUR OWN EDUCATION!

• Read the syllabus carefully, and write down in your organizer the dates on which assignments are due. This will help you budget your time for the weeks when there is more work than normal.

• Complete all the assigned readings every week in a timely fashion, preferably in one or two study sessions, and jot down important points in your notes after finishing the readings. This should take about three hours every week, or possibly more. As you read each assignment, think about how it relates to earlier readings and lectures, and jot down some of those thoughts in your notes. Don’t use a highlighter for note-taking: it substitutes moving your hand for using your brain.

• Look up unfamiliar words in a good dictionary. Look up unfamiliar names or concepts in an encyclopedia. The Columbia Encyclopedia (online at bartleby.com) is a good one-volume encyclopedia; the Encyclopaedia Britannica is a good multi-volume encyclopedia.

• If your apartment or dorm room aren’t quiet places to study, go to the library or somewhere else quiet. The main level of DuBois Library is a good place because it has lots of dictionaries and encyclopedias. If you need coffee while studying, try the Newman Center. Study a lot during the day, then you can relax in the evening without feeling stressed out or guilty.

• Ask questions about what you don’t understand, but only after you have tried to answer them yourself. Part of your college education is learning to be self-reliant. Who should you ask? Us, of course; if your question is factual, you can also ask a reference librarian.

• Take advantage of our office hours. We are there to help you in the course! We can give you more help, though, if you come with specific questions or issues to discuss.

• Come to each class prepared to discuss at least two or three of the issues raised by the readings, and to write a five-minute theme on them.

• Arrive for class on time, and pay attention to lectures and discussions. Take good notes. If you need guidance on note-taking, Learning Support Services (DuBois Library, 10th floor) offers a Note Taking Workshop several times each semester. They also offer workshops in time management and test taking should you feel in need of help in those areas.

• Keep a journal of your reactions to the course, the things that puzzle you, and the insights that you have about the course material. Review the journal regularly. It will help you keep track of the big picture. It will also be a record of your progress in the course.

• Start work on the report assignment as soon after you receive it as your schedule allows. Complete a rough draft of at least five days before it is due, and revise your report at least once before you hand it in. Be sure to copyedit and proofread it carefully.

• Consider forming a study group. Research shows that students who participate in study groups learn more and enjoy their courses more than those who don’t.

• Talk to us if you feel overwhelmed or if you are falling behind in the course. Most problems are small at the beginning; we can help prevent them from becoming big.