

HISTORY OF TECHNOLOGY FROM PREHISTORY THROUGH THE INDUSTRIAL REVOLUTION

History 3715, CRN 93039

Cross-listed as Science and Technology Studies (STS) 3715, CRN 94716

Fall Semester 2005

Instructor: Professor Richard Hirsh

Office: Major Williams 425.

Office Hours: Tuesdays and Thursdays 12:20-1:20 PM, and by appointment. (My schedule is not yet fixed, but I can usually meet with students at several other times. Just write me a note and we'll arrange a convenient time to meet.)

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Course web site: <http://www.history.vt.edu/hirsh/hist3715/hist3715-f05.htm>. More information on Blackboard.

Professor's home page: <http://www.history.vt.edu/Hirsh/>

Modern society can be characterized by technological achievements and their ill-considered side effects. For example, we are familiar with powerful machines, grandiose architectural masterpieces, and time-saving devices as well as environmental pollution, energy shortages, and labor unrest. But these technological elements of society are not unique to modern times. They existed hundreds of years ago in societies that produced new inventions and engineering techniques while also facing--not always successfully--challenges concerning how to use them effectively.

In this course, we will examine the history of technology from prehistoric times through the onset of the industrial revolution in the 17th and 18th centuries, when big machines and huge sources of power emerged as part of a new socio-economic order. Besides looking at technological accomplishments, we will also consider their social impact. Since many responses to technology have not changed much since ancient times, a study of the development of early technologies may give us insights into recent achievements and their effects on modern life.

This is the first of a two-semester sequence in history of technology. The second course in the sequence, History 3716, concerns the continuation and spread of the industrial revolution to other countries in the 1800s. It also deals with the history of modern technology in America in the 20th and 21st centuries. HIST 3716 will be offered in Spring 2006.

COURSE GOALS

In general, I hope students will gain the following by the end of the course:

- 1) An historical understanding of the development of technology.
- 2) An appreciation for the social dimensions of technology—i.e., the way society and technologies interact in subtle and explicit ways.
- 3) An enhanced ability to communicate your understanding of historical events.

COURSE REQUIREMENTS

Two mid-term examinations, one paper, a final examination and substantive class participation. Grades will be assigned using the following formula:

| | |
|--|------------------|
| Exams 1 and 2 | 45% (22.5% each) |
| Paper—due 18 October | 22.5% |
| Final exam | 22.5% |
| Class participation (incl. anchor assignments, attendance, etc.) | 10% |

The standard grading system will be used (60-69 = D; 70-79 = C; etc). Pass/Fail students should remember that they need at least the equivalent of a D to pass (not D-).

The Virginia Tech honor code will be strictly enforced in this course. All assignments submitted shall be considered graded work unless otherwise noted. All aspects of your coursework are covered by the honor system. Honesty in your academic work will develop into professional integrity. The faculty and students of Virginia Tech will not tolerate any form of academic dishonesty. Plagiarism constitutes a violation of the honor code. Please make sure you understand what plagiarism is and how to avoid it in your work. See <http://athena.english.vt.edu/~1styear/plagiarism.html> for more information on the subject.

Any student who has a documented disability and will need an accommodation because of a disability should make an appointment to see me during office hours. I'll make every effort to assist you.

Common Courtesy and Electronic Equipment Policy: For the sake of others (and me!), please disable the ringer on your cell phones before coming to class. Feel free to use a computer in class, but only for class purposes. If we are discussing a topic and you want to find related information on the web, go for it! But please do not use your computer for general web surfing, e-mail, blog writing, IM-ing, or other unrelated work. I find this use of computers in class to be rude and annoying. In class, I want you focused on our work. You have plenty of time outside of class for other online activities.

REQUIRED READINGS:

Jean Gimpel, *The Medieval Machine* and other short articles (listed below). Articles are available on the Blackboard system. Sign in at <http://www.edtech.vt.edu/ocs/login.htm>.

Links to class outlines, questions to guide readings, and tips for good writing can be found on Blackboard.

TENTATIVE SCHEDULE:

| | TOPIC # |
|----------------------------|--|
| Aug. 23 | 1. Course Introduction |
| <u>ANCIENT TECHNOLOGY</u> | |
| Aug. 25 | 2. Prehistoric Technology and the Agricultural Revolution (Washburn and Drucker articles) |
| Aug. 30 | 3. Technology in the River Valley Civilizations (Wendorf article) |
| Sept. 1 | 4. Craft Technology in Antiquity (Childe article) |
| Sept. 6 | 5. Craft Technology, continued, and Film, "The Hidden Structure." (Maddin article) |
| Sept. 8 | 6. Technology in Classical Greece (MacLaughlan and Landels articles) |
| Sept. 13 | 7. Technology in Classical Rome (Smith and Foley articles) and 8. The "Failure" of Ancient Technology. |
| Sept. 15 | EXAMINATION # 1 |
| <u>MEDIEVAL TECHNOLOGY</u> | |
| Sept. 20 | 9. Transition to Medieval Technology and the Energy Revolution (Gimpel, Chs. 1, 4) |
| Sept. 22 | 10. The Agricultural Revolution (Gimpel, Chs. 2, 3) |
| Sept. 27 | 11. Medieval Military Technology I. Stirrup and Bows (Young article) |
| Sept. 29 | 12. Medieval Military Technology II. Firearms and Fortifications (Volunteer student presentations) |

- Oct. 4 SPECIAL CLASS: Historical Research using the Internet. Note different meeting place: **Newman Library, Macintosh classroom** (room 207, just off the reference room). This class will be run by Bruce Pencek (bpencek @ vt.edu), College Librarian for the Social Sciences.
- Oct. 6 13. Clocks and Culture (Gimpel, ch. 7)
- Oct. 11 14. The Printing Press and Medieval Society (Cardwell article, "The Printing Press")
- Oct. 13 Film: "Faith in Numbers." Don't miss it! This is a great review of this section of the course.
- Oct. 18 15. Medieval Mining and Metallurgy (Pacey and Dibner/Agricola articles) **PAPER DUE TODAY**
- Oct. 20 16. The "Success" of Medieval Technology (Casson and White articles, Gimpel, Ch. 9 and epilogue)
- Oct. 25 EXAMINATION # 2

THE INDUSTRIAL REVOLUTION

- Oct. 27 17. A New Intellectual Framework for Technology (Gimpel, Ch. 8 and Cardwell, "Galileo"—reproduced with Cardwell, "Printing Press" article, above)
- Nov. 1 18. Background to the Industrial Revolution in England (Chamberlin and Stearns articles)
- Nov. 3 Film: "Drive for Power." Great preview of this section of course.
- Nov. 8 19. Steam Engine Development (Ferguson article)
- Nov. 10/20. Steam Engine Development, continued (Boulton letter)
- Nov. 15 21. The Textile Industry and Factory System (Cardwell articles: "The Origins of Modern Technology," and "Arkwright and His Contemporaries." Also: Cotton Statistics)
- Nov. 17 22. Coal and Iron in the Industrial Revolution (Harris, Vialls and Lewis articles) **Deadline for rescheduling final exams is Friday, 18 November.**
- Nov. 22 & 24 Skill lab on poultry preparation technologies as developed in the industrial era. Practical test on 11/24.
- Nov. 29 23. Revolution in Transportation I: Canals and Steamboats (McNown, Tarkov, and Boorstin articles).
- Dec. 1 24. Revolution in Transportation II: Steam Locomotives (Blackford article)
- Dec. 6 Course Conclusion (Langer and McClellan articles [The McClellan article is a wonderful summary of many themes from this part of the course.])
- Dec. 14 Wednesday, FINAL EXAMINATION, 2:05 PM – 4:05 PM. No changes without official permission from Dean's office. Deadline for rescheduling is 18 November.

PAPER ASSIGNMENT (due 18 October)

Background to Assignment: Technology consists of more than simple hardware or pieces of machinery. While tools, machines, artifacts, inventions, and processes are elements of technology, so are the components of knowledge and organization. Meanwhile, the history of technology is more than just a chronological narrative of inventors and their creations. It is a study of how humans adapted the natural world to their needs and desires in different time periods and cultures. Besides machinery, historians must be conscious of social, economic, cultural, and psychological elements.

A. The Assignment: Keeping these concerns in mind, choose a technology or technological process and discuss it by answering the following questions:

- Why and how was it developed? What need or motivation was there for the innovation? (Money? Military security? Replacing another technology that no longer was efficient?) What individual people were involved and what were their goals? In other words, what was the background and history of this development?
- What did the technology do? Describe the innovation in enough detail so that I know you understand how it works. There is no need to write a highly technical monograph about the technology; just write a simple, yet informative, description that discusses the technology's major features. Why was it an improvement over what preceded it?
- What impact did the innovation have on society and on other technologies? How did it change people's lives, and how did it affect the development of other technologies?

The purpose of this paper is to give you more experience with concepts and themes in the history of technology. Your case study should provide insight into the nature of technological innovation and its impact on society. Make sure the paper is historical and analytical--not just descriptive. In other words, I am not looking for a chronology of events. Rather, I want an historical analysis of the evolution of a technology that explores the subject from both a social and technical perspective. The surest way to receive a poor grade is to overlook the historical aspect of the assignment.

B. Guidelines:

Use this list of guidelines as a checklist before submitting your paper. You will benefit greatly from reading these guidelines before you start writing your paper.

- 1) The paper should be written on an innovation made during the time period we are studying in the course (i.e., from prehistory to about 1830).
- 2) Do not write on an innovation I have lectured about (or will lecture about) in class. I want you to study something new. Contact me (e-mail is OK) for approval before you begin work on the paper.
- 3) Make sure your paper focuses on one development only. You could conceivably write about an early type of plow, for example, but do not write generally about early agriculture. You may need to write about aspects of broader subjects, but I want a narrowly focussed paper on a single innovation.
- 4) Give your paper an appropriate title. Also, write a good introductory paragraph that informs the reader what the paper will be about.
- 5) Do not write gratuitous final paragraphs that praise the subject of your paper. Your subject does not need to have been the most significant invention in history to be worthy of a paper. I.e., don't overstate your case!
- 6) Use footnotes or endnotes throughout your paper to indicate the source of your information. See a good writing primer to help you include notes at appropriate points. At the least, **you should use one note for each paragraph** that contains information not considered common knowledge. Use any consistent note style that you like, though most historians use the so-called Chicago style of notes. Failure to use notes constitutes plagiarism, which is an honor code violation at Virginia Tech. Absence or inadequate use of notes will incur a severe penalty.
- 7) List the sources of your information in a bibliography. Supply the Virginia Tech call numbers for the books you used. You should list at least five sources exclusive of encyclopedias. At least three sources must be hard copy (i.e., books or articles from the library). Make sure you check the periodical indexes and online sources for articles as well as for books. In other words, don't just depend on books, because there may be few for your subject. And don't just depend on online sources either. Penalty for omission of sources: 5 points per missing source.
- 8) The paper should be 500 words long, plus or minus 50 words. This number equates to about two pages. (Do not include notes or bibliographic material in the word count.) The paper must be double spaced. Include a word-count at the end of the text. If the paper is more than 10% too long (or too short), I will deduct 5 points for each 10% increment. (I.e., 5 points off for 10.1 to 19.9% too long or short; 10 points off for 20.1 to 29.9% too long or short, etc.) A missing word count will cost you a minimum of 5 points.
- 9) Include pictures if they will help in describing the innovation. The picture captions should not count in the word limit.
- 10) Avoid using the verb "to be." ("To be" is the infinitival form of "am," "is," and "are" in all tenses.) The verb often invites the use of passive voice (which hides historical accountability) and contributes to dull sentences. Penalty for use more than 4 times in paper: 1/2 point per use. See "Writing Tips" on course web page and writing style manuals

for further explanations. Also read the chapter by Good (on Blackboard) called "Word War II: To Be or Not To Be" for help on this rule.

- 11) Proofread your paper to make sure you did not make spelling or typing errors. For every error more than 4, I will deduct 1/2 point. Feel free to use computer spell- and grammar-checkers.
- 12) For your own protection, make a copy of your paper (or your word processor file) and keep it in a safe place.
- 13) The word "it's" means "it is." Do not confuse the contraction with "its."
- 14) Do not use quotations from other sources that are longer than one sentence, especially those from secondary sources (i.e., articles or books written about the subject you are studying). Long quotations are sometimes used to suggest understanding, but they often hide a student's misunderstanding of a concept. Paraphrase what the author has written instead. You may be able to say it better in your own words.

LATE PAPER POLICY: I will accept papers that are turned in late, but with the following penalty. Each calendar day (including weekend days) after the due date, I will deduct 10 points. (Late papers may be submitted by e-mail on nonclass days to avoid further penalties.) This policy may appear harsh, but you have known about the due date since the beginning of the term. Please begin work on the paper early enough so that you do not incur this penalty.

CLASS PARTICIPATION: ANCHOR-PERSON'S RESPONSIBILITIES

To encourage discussion and understanding in class, a few students will be designated "anchors" for each class. The anchor will be conversant in the subject of the day and will be called upon to discuss the reading or lecture content. The role of anchor will rotate throughout the class so that each student will participate at least **twice** during the term. The class participation component of a student's grade will be based largely on his/her performance as an anchor, but don't hesitate to speak up on other occasions.

Rationale: In the "real" world, you will often be expected to interact verbally with colleagues. You will need to think "on your feet" and be reasonably coherent. This activity will help in preparing for these situations. Also, even though class participation counts toward the final grade, many students are simply nonparticipants. This activity will force people to open up. Note: Just because you are not an anchor-person does not relieve you of the responsibility of preparing for class. You never know when the instructor will get "mean" and ask other students about the assignment.

Also make sure you have been an anchor at least **twice** during the term. If you do not participate as an anchor, you will receive a "0" for a portion of your final grade.

Pre-Class Obligations:

- Be totally familiar with the reading of the day.
- Perform extra work in the library and online. Read about the subject in a good encyclopedia (such as the *Britannica*) and find other articles on the same subject (see the footnotes in the assigned articles, for example).
- Hand in your list of outside sources, using any consistent style of bibliographic citation system. (I.e., include the name of the article, its author, book/journal title, volume number, publisher, page numbers, and Virginia Tech call number.) Don't list encyclopedia articles, though you may certainly use them to get citations for other readings.
- You are required to locate and read at least two sources from books, journals, etc. You are also required to locate and peruse at least two Web sites (and include their URLs). Double-check the URLs that you list. I get upset (and assign lower grades) when a typographical error on your part sends me to nonexistent or incorrect web sites.
- Write a brief (**2 paragraph minimum**) description of the important points you discovered in each of your hard-copy sources. (I.e., two sets of descriptions.) For each web site, describe the on-line document and explain briefly (**in one paragraph minimum**) its usefulness in enhancing your understanding of the subject.
- List the printed sources and web sites on a separate sheet at the end of your report. (Put your name on it too.) I will remove this sheet before returning your assignment to you.

In-Class Obligations: You may be asked to:

- Summarize the major points of the readings.
- Respond to questions from the professor and other students.
- Offer opinions based on the readings, previous classes and assignments, and experiences in life.