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. Because 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/STS 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.

**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:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Exams 1 and 2</td>
<td>45% (22.5% each)</td>
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<tr>
<td>Paper</td>
<td>22.5%</td>
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<tr>
<td>Final exam</td>
<td>22.5%</td>
</tr>
<tr>
<td>Miscellaneous (incl. blog contributions, participation, attendance, etc.)</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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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://info-skills.lib.vt.edu/using_info/2.html](http://info-skills.lib.vt.edu/using_info/2.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, tablet, or smartphone 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 equipment for general web surfing, e-mail, blog writing, Facebook-checking, 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. You may think that you’re fooling the old professor since he can’t see your screen, but he will know when you’re doing non-class work or play, and he won’t appreciate it.

REQUIRED READINGS:

Jean Gimpel, *The Medieval Machine* and other short articles (listed below). Articles are available on Canvas/Files/Course readings. The Gimpel book is not in the bookstore and is no longer in print. However, you can order it online (from Amazon.com and other vendors) for as little as $4.00 including shipping. We will not use the book until the second section of course—several weeks from the start date. Please order a copy so you will have it available by the time we begin topics dealing with the Middle Ages.

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

TENTATIVE SCHEDULE:

<table>
<thead>
<tr>
<th>TOPIC #</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>Jan. 20</td>
<td>1. Course Introduction: History, Historiography, and Technology (Hughes article)</td>
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<tr>
<td>Jan. 25</td>
<td>2. Prehistoric Technology and the Agricultural Revolution (Drucker, Washburn, and Carlson articles)</td>
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<tr>
<td>Jan. 27</td>
<td>3. Technology in the River Valley Civilizations (Wendorf article)</td>
</tr>
<tr>
<td>Feb. 3</td>
<td>5. Early technology in China (reading to be announced)</td>
</tr>
<tr>
<td>Feb. 8</td>
<td>6. Technology in Classical Greece (MacLaughlan and Landels articles) Second broad topic blog due today.</td>
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<tr>
<td>Feb. 10</td>
<td>7. Technology in Classical Rome (Smith and Foley articles)</td>
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<tr>
<td>Feb. 15</td>
<td>8. The &quot;Failure&quot; of Ancient Technology (reading to be announced)</td>
</tr>
<tr>
<td>Feb. 17</td>
<td>EXAMINATION # 1</td>
</tr>
</tbody>
</table>
MEDIEVAL TECHNOLOGY AND SOCIETY

Feb. 22 9. Transition to Medieval Technology and the Energy Revolution (Gimpel, Chs. 1, 4, Reynolds article)

Feb. 24 10. The Agricultural Revolution (Gimpel, Chs. 2, 3) **Third broad topic blog due today.**

Feb. 29 11. Medieval Military Technology I. Stirrup and Bows (Young, Clarke, and Guttman [stirrup], and Guttman [English Longbow], Zabecki articles)

Mar. 2 12. Medieval Military Technology II. Firearms and Fortifications (Falkner article) **Narrow topic blog due today**

Mar. 14 13. Clocks and Culture (Gimpel, ch. 7)


Mar. 21 15. Medieval Mining and Metallurgy (Pacey and Dibner/Agricola articles) **PAPER DUE TOMORROW, Mar. 22, by 5:00 PM.**

Mar. 23 16. The "Success" of Medieval Technology (Casson and White articles, Gimpel, Ch. 9 and epilogue)

Mar. 28 Expansion time

Mar. 30 **EXAMINATION # 2**

THE INDUSTRIAL REVOLUTION

Apr. 4 17. A New Intellectual Framework for Technology (Gimpel, Ch. 8 and Cardwell, "Galileo"—reproduced with Cardwell, "Printing Press“ article, above)

Apr. 6 18. Background to the Industrial Revolution in England (Chamberlin and Stearns articles)

Apr. 11 19. Steam Engine Development (Ferguson article)

Apr. 13 20. Steam Engine Development, continued (Boulton letter and Reyburn article) **Deadline for rescheduling final exams is April 15.**


Apr. 20 22. Coal and Iron in the Industrial Revolution (Harris, Vialls and Lewis articles)

Apr. 25 23. Revolution in Transportation I: Canals and Steamboats (McNown, Tarkov, and Boorstin articles).

Apr. 27 24. Revolution in Transportation II: Steam Locomotives (Blackford article)

May 2 Expansion time

May 4 Course Conclusion (Langer and McClellan articles [The McClellan article is a wonderful summary of many themes from this part of the course.])

May 10 Thursday, **FINAL EXAMINATION, 3:25-5:25 PM.** No changes without official permission from Dean's office.
BLOG POSTS

We’ll use the blog site for two general purposes:

Reading summaries and links. Each student will need to write blog posts for two or three of the readings (depending on how many students are in the class). The assignments will be made after the first class. (Feel free to volunteer for readings on subjects that interest you.)

In these brief discussions of the readings, you should include the following elements:

- Description of the overall thrust, theme, or thesis of the reading.
- A few examples to illustrate the thesis.
- A short commentary (i.e., your interpretation) of the reading's meaning.
- A fun (but related) comment or two.
- At least two (non-encyclopedia) links to content related to the reading or the class lecture.
- Include your name and a word count. Text should consist of at least 200 words—more if you really enjoy the assignment.

Blog authors should make sure they come to class when their articles have been assigned since they 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.

See an example for the first blog post (on the article by Hughes) at http://richardhirsh.net/histtech3715s16/.

Aside from writing your assigned reading summaries, you will need to write at least one substantive comment on your colleagues’ summaries every other week, starting on Jan. 25 (for a total of 12 such comments). These blog comments are due on Saturday at noon of the week in which the articles are posted. You can take issue with the author’s description of the reading; you can amplify upon it; you can find online sources that do either of the above or go beyond the reading; etc.

Research project preparation. Instead of waiting to the last minute to prepare the research paper (though who would really wait that long?), we’ll use the blog to help you identify a topic and learn more about how to assemble a good paper. Other students can chime in with comments and suggestions.

Step 1. Over the course of several weeks, you’ll do some work to identify three broad topics in the history of technology. One of these topics will likely become the the subject of your short research paper. Look at the sample (http://richardhirsh.net/histtech3715s16/paper-project-example/) and notice that you need to offer a simple title, and do the following:

A. Explain why this topic interests you. You don’t need to do too much research for this section.
B. List a few (two or more) online references (and academic references, if you like) and explain why they’re interesting.

Step 1a. First broad topic blog post due: Feb. 1.
Step 1b. Second broad topic blog post due: Feb. 8.
Step 1c. Third broad topic blog post due: Feb. 24.
Step 2. Narrow the topic and find some good references. Choose one of the topics from step 1 and commit to it. Now focus more on something that you can write about intelligently in about two pages.

A. In a few sentences, describe your topic in more detail. Include a sentence that describes the thrust (or thesis) of your research.

B. Find at least six sources of information using “Summon” on the VT Library homepage (http://www.lib.vt.edu/) or proprietary databases. Write short annotations about two of them, and list all of them at the end of the blog. (Feel free to add pictures or other interest-inducing features).

Step 2. Narrow topic blog due: Mar. 2.

Use these previous experiences to help you write an insightful, albeit short, research paper. See the detailed guidelines for the paper, below.

PAPER ASSIGNMENT

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 met needs?) 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. You do not 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 did people see it as an improvement over what preceded it?
- What impact did the innovation have on society and on other technologies? How did its use change people's lives, and how did its use affect the development of other technologies? Provide real data and support for your assertion. (Do not argue, without evidence, that the steam engine changed the way people think about nature, for example. Though perhaps true, the statement requires solid evidence to make it credible.)

I have designed this assignment 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, do not simply write a chronology of events. Rather, offer an historical analysis of the evolution of a technology that explores the subject from both a social and technical perspective. You will receive a poor grade if you overlook the historical aspect of the assignment.

B. Guidelines:

1) The paper should be written on an innovation made during the time period we are studying in the course—i.e., in the years before about 1800.
2) Do not write on an innovation I have lectured about (or will lecture about) in class. I want you to study something new. Talk to me (or e-mail me) for approval before you begin work on the paper. I may also help direct you to useful resources.
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 about early agriculture. You may need to write about aspects of these broader subjects, but I want a narrowly focussed paper on a single innovation.
4) Give your paper an appropriate title. Write a good introductory paragraph that informs the reader about the paper’s topic and argumentative thrust.
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 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 (at least 15 points).
7) List the sources of your information in a bibliography. You should list at least six sources exclusive of encyclopedias. (Feel free to use the sources found during the blog assignment.) You may use books, articles, and other sources, many of which are available online (especially through the VT Library website). Penalty for omission of sources: 5 points per missing source.

8) The paper should be 400 words long, plus or minus 40 words, exclusive of the paper’s title, bibliography, notes, etc. (i.e., just the body of the paper). The paper must be 1.5- or double spaced with margins no bigger than 1.5 inches on each side (1 inch on 3 sides and 1.5 inches on the right side would be fine.) Include a word-count at the end of the text. If the paper is more than 40 words too long (or too short), I will deduct 5 points for each 40-word (or partial) increment above 440 words or below 360 words. (For example: 5 points off for 320-359 or 441-479 words; 10 points off for 280-319 or 480-519 words, etc.) If you do not include a word count, I will deduct 10 points and then count the words myself to determine if other deductions are called for.

9) Include pictures if they will help in describing the innovation. The picture captions do not count in the word count limit.

10) Proofread your paper to make sure you did not make spelling, typing, and grammatical errors. For every error more than 4, I will deduct 1/2 point. Feel free to use computer spell- and grammar-checkers.

11) For your own protection, make a copy of your paper (or your word processor file) and keep it in a safe place.

12) The word “it’s” means “it is.” Do not confuse the contraction with “its.”

13) 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 my "Writing Tips" and writing style manuals for further explanations. Also read the chapter (by Good) on Canvas/Files/Useful articles called “Word War II: To Be or Not To Be” for help on this rule.

14) Do not use quotations from other sources that are longer than 1 sentence, especially those from secondary sources (i.e., articles or books written about the subject you are studying). Long quotations are often 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. I will deduct points for the excessive use of quotations.

15) Submit the paper electronically to the Canvas/Assignments/Short Research Paper on the due date (noted below). Give the file a name using the following format: LastName-3715.docx; example: Hirsh-3715.docx.

See Canvas/Files/Useful articles for links to more tips for good writing.

LATE PAPER POLICY: I will accept papers that are handed in late, but with the following penalty. Each calendar day (including weekend days) after the due date, I will deduct 10 points. 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. (Of course, unexpected events crop up occasionally, and I’ll try to be sympathetic if they do. Please contact me as soon as possible after such events so we can make accommodations.)

Paper due date, submitted to Canvas by 5:00 PM in .doc or .docx format: Mar. 22.