

History of Science and Technology

AK1202 (7.5 hp)

Division of History of Science, Technology and Environment, KTH

Version 1, 31 January 2024

Content and learning outcomes

Course content

How important science and technology for today's and yesterday's societies? Many people think that the difference is huge and point out that our lifestyle is quite different from the daily activities of previous generations. Think of all the new hi-tech gadgets that allow ever-greater connectivity between people, objects and places. However, historians tend to emphasise the continuity of this techno-age and its big science with previous eras. Many of the recent scientific or technological breakthroughs have quite similar precedents in the past or, as it turns out, were not so new after all. Consider that most of the appliances in your modern kitchen were invented before the Second World War; the first electric car was tested in 1827; and the wheel, writing and agriculture (the pillars of our civilization) exist for thousands of years. This course provides an overview of the history of science and technology in the Western world during the last two centuries. One of the key ideas of this course is that science and technology are socially constructed – created and used by particular people in their own historical context. This applies to “history” as a discipline as well, and the course will also describe basic concepts and approaches used by historians of science and technology in their craft. Importantly, the course aims teaching students to apply this knowledge in practice. Students will learn to read critically and to design their own research. They will acquire skills in selecting and analysing relevant information, and in producing a short paper that can stand up to peer review.

The course will examine the historical relationship between science, technology and society, focusing on Europe after 1800. Throughout the course, we will ask two fundamental questions in relation to modern Europe: How much did science and technology determine the social order? And to what extent have culture and society shaped science and technology? In doing so, we will focus on the temporal dynamics and cultural context of scientists' and engineers' behaviour and choices, as well as the impact of their activities. As a result, the course will shed light on the historical ties between science, technology, society, well-being and war.

Learning objectives

After passing the course, the students should be able to:

- *Identify* major changes in science and technology over time;
- *Describe* how central ideas in science and technology, such as discovery, progress, innovation, modernity, risk, etc., have been historically and socially constructed;
- *Identify* sources and methods used in historical writing and critically assess the validity of the argument;
- *Explain* how understanding the historical dimensions of issues with contemporary significance can inform responsible actions in the present;
- *Demonstrate* analytical reading and writing skills on the topics central to the course.

Learning activities

This course will consist of **13 sessions and 12 home assignments**. The sessions will provide a broad intellectual horizon of the history of science and technology. The seminars and workshops will train students in critical historical reading, research and communication skills. While attendance of lectures and seminars is not compulsory, students are expected to complete all home assignments (which is a prerequisite for the submission of the final essay). Each assignment essay submitted via Canvas should be no longer than 750 words (with the exception of the final essay, which should be under 1,500 words). By preparing an assignment essay (& receiving feedback from a teacher), students will improve their skills in writing the final essay. Therefore, a delay in submitting an assignment will result in a delay in receiving feedback on it - this could problematise the student's progress. Home assignments will be graded with Pass/Fail note. For each assignment submitted on time and noted with Pass, the student will receive 1 point to add to the score of the final essay. The course assessment takes place at the end of the course through the production of the final individual essay. The final grade is 100% based on the essay (plus extra points from home assignments). The whole course is therefore structured to train students to write a high quality essay in the field of the history of science and technology.

Essay: During the course you will be required to write your own individual essays. The essays must be in the form of a longer argumentative text on a topic in the history of science and technology. It can be about the present or the past, but it should include some kind of historical perspective. Your final essay should consist of 3 main parts: an introduction, a body and a conclusion. In the introduction, you should identify a wider problem that you want to address (knowledge gap). Then, in the body, you should outline your argument, its claims and evidence. The argument should be linked to one of the concepts in the history of science and technology and should be supported by analyses of (at least) two types of different sources (from scholarship and/or primary sources). You should also provide a critical assessment of the limitations and potential weaknesses of your argument. Thirdly, the essay should conclude with a discussion of how your argument narrows or reframes the broader problem identified in the introduction. Detailed guidelines for preparing the essay will be discussed during the classroom activities, but you can get an idea of what the essay should look like by reading the marking table at the end of the PM.

The final essay must not exceed 1,500 words, excluding references and bibliography. Any text exceeding this limit will not be marked. You will submit the final version of your essay via Canvas no later than Thursday 23 May 2024. Late submission will result in a lower grade, but no essays will be accepted after 7 June 2024.

Schedule

Thu 1 Feb 13:15-15:00 (Location: K53, Teknikringen)

Teacher: Aliaksandr Piahnanau

Session 1 will introduce key concepts of the history of science and technology, and provide a snapshot of the course, including the home assignments.

Home assignment 1 (submit before 6 Feb 2024 on the Canvas). Freely select and read 1 or more short scholarly publications (papers, articles, or book chapters) on a topic in the history of science and technology that interests you. Then write a short essay (up to 750 words, excluding references) on the text you have read. Your essay should identify the argument, main claims and supporting evidence (sources) of the scholarly publication. Anonymise your essay - don't include your name in your essay.

Tue 6 Feb 13:15-15:00 (Location: V11, Teknikringen)

Teacher: Aliaksandr Piahnanau

Are scientists and researchers only guided by the search of “truth” or “technical improvements” disregarding any personal interests in their work? **Session 2** will discuss scientists as a social group. We will underline some of their basic characteristics, which distinguish this group from other social-professional milieus.

Assignment 2 (submit before 12 Feb): Freely select and read 3 or more short scholarly publications (papers, articles, or book chapters) on a topic of the last lecture (scientists as a social group) that interests you. You will then write a short essay (up to 750 words) on the texts you have read. Your essay should identify and compare the main definitions (concepts), arguments, claims and evidence of the selected scientific publication. Anonymise your essay.

Thu 8 Feb 13:15-15:00 (Location: V01, Teknikringen)

Teacher: Aliaksandr Piahnanau

Together with traders, military and missionaries, scientists were helping spreading European colonial rule over the world, but in parallel they also built their own international research networks. **Session 3** will provide a historical overview of international (Western) science since 1870. One part of the session will be devoted to questions and answers about the previous or current home assignments.

Tue 13 Feb 13:15-15:00 (Location: V01, Teknikringen)

Teacher: Aliaksandr Piahnanau

Do you agree that the complex urban society cannot exist without the support of agriculture and of writing? Was the European colonial expansion predetermined by its technological advancement over other regions? **Session 4** will discuss technological determinism and questions such as: How far do some technologies shape society? To what extent do particular technologies cause predetermined broader social changes?

Assignment 3 (submit before 29 Feb): Freely select and read 3 or more short scholarly publications (papers, articles, or book chapters) on a topic of the previous two lectures (science in international relations; technological determinism) that interests you. This topic and these texts should be different from those used in the previous assignments. Then write a short essay (up to 750 words) based on the texts you have read. Your essay should be clearly divided into 3 parts: introduction, body, conclusion. Most importantly, the essay should contain your own argument, supported by claims and evidence.

Thu 15 Feb 13:15-15:00 (Location: D35, Lindstedtsvägen)

Teacher: Aliaksandr Piahana

Speaking about technologies make us thinking about novelty. This perspective is very misleading. **Lecture 5** will examine the old technologies that surround us.

A part of the session will be dedicated to questions and answers regarding the previous or ongoing home assignments.

Tue 19 March 13:15-15:00 (digital or on site)

Teacher: Aliaksandr Piahana

Science and technology are often associated with improving human health and longevity. But to what extent does this assumption hold historically? **Lecture 6** will deal with the scientific (and technological) practices of disease prevention. We will discuss how the knowledge, practices and success of disease control have changed over time.

Assignment 4 (submit before 25 March). Select and read 3 or more short scholarly publications (papers, articles or book chapters) on a topic of last 2 lectures (old but lasting technologies; history of medicine and epidemiology) that interests you. This topic and these texts should be different from the previous assignments. You will then write a short essay (up to 750 words) based on the texts you have read. Your essay should be divided into 3 parts: introduction, body, conclusions. The essay should contain your own argument, supported by claims and evidence. Most importantly, the essay should conclude by discussing the limits of your argument: how well does your conceptual focus fit the topic you have chosen? Are there any contradictions between the argument and the claims? How representative and direct is your evidence in relation to the argument?

Thur 21 March 13:15-15:00 (digital or on site)

Teacher: Aliaksandr Piahana

Many technological innovations are associated with military. What is the historical relation between war and science? **Lecture 7** will discuss how science and technology affected the warfare, and how military technologies accompanied social change.

One slot of the session will be dedicated to the questions and answers regarding the previous or the ongoing home assignments.

Tue 26 March 13:15-15:00 (digital or on site)

For millennia thinkers were puzzled by where our ideas come from, and scientists developed many ingenious theories and experiments revealing the limits of conscience and of self. **Lecture 8** will explore the history of human science, psychology and other social disciplines. It will raise questions of social engineering in historical perspective.

Assignment 5 (submit before 2 April): Take 1 or more of any of your previous assignments or new scholar papers related to the course and write an essay where you falsify (or suggest how to disprove) the arguments of these texts. Word limit – 750 words.

Tue 3 April 13:15-15:00 (digital or on site)

Teacher: Aliaksandr Piahana

Most of historians research so-called “primary (narrative) sources”, and at **Lecture 9**

we are going to see how primary sources may be analysed and what kind of conclusions may be based on them. We will also see what kind of information may be retrieved from other sources: data, images, sounds and material objects.

Assignment 6 (submit before 9 April): Write a short essay (up to 750 words) based on 3 new texts. Your essay should include a problem and a research question (in the introduction); argument-claims-evidence plus limits of the argument (in the body); conclusions (where your argument brings new perspective to the problem).

Assignment 7 (finish before 15 April): read Latour, B. (1999). "Circulating reference: Sampling the soil in the Amazon forest". In B. Latour, *Pandora's hope: Essays on the reality of science studies* (pp. 24-79). Harvard University Press. Write a short analytical essay on the Latour paper.

Thu 16 April 15:15-15:00 (digital or on site)

Teacher: Erik Ljunberg

Session 10 will be focus on Making Scientific Facts, and it will introduce the anthropology of scientific practice.

Assignment 8 (submit before 22 April). Use the KTH or another research organizations as a case study site for your small ethnographic research. Observe and interviews researchers, staff or other students to note common behaviours, interests, social structures; use your notes as source materials to write your short essay (750 words).

Tue 23 April 13:15-15:00 (digital or on site)

Teacher: Per Högselius

Our modern civilization, apart of being considered science and technology-based, is also a fossil fuel civilization, consuming huge amounts of energy. **Lecture 11** will discover the place and the role of energy technologies in the modern world.

Assignment 9 (submit before 31 April): Prepare the draft 1 of your final essay (up to 750 words). You may rely on the literature that you have already studied in the course (or elsewhere), and build your draft essay on one of your previous assignment essays.

Assignment 10 (prepare by 14 May): Prepare an oral presentation of your final essay (two versions: short (under 3 minutes) and long (under 5 minutes)).

Assignment 11 (submit on workshop 2 on 16 May): Prepare a short feedback on each draft of the final essay by your peers that you receive from the teacher.

Tue 14 May 13:15-15:00 (Location: V12, Teknikringen)

Teacher: Aliaksandr Pihanau

Workshop 1. Oral presentations. Students will present their research projects, consisting of introducing the topic, research questions, an argument and its claims, evidence (sources and methods), limits and conclusion. Other students will be asked to give critical feedback to other presentations.

Tue 16 May 15:15-17:00 (Location: V12, Teknikringen)

Teacher: Aliaksandr Pihanau

Workshop 2. Peer-reviewing. After learning about the peer-reviewing process, students will exchange their paper drafts and peer-review it in small groups. The authors can use this feedback to improve their final essay.

Assignment 12 (due by 23 May): Students rework their draft essay taking into account critic they received after oral presentation & produce the final essay version (under 1,500 words excluding references).

The final mark for the course will be composed of the evaluation of the final essay (100%). The score of the final essay might be increased by points gained for submitting the home assignments on time (plus 12 points max.). Only the final essay submitted on time might receive A grade. Any late submission (starting from 24 May 2023) will result in lowering the grade by one letter per week of delay: from B to C, for example, if the delay was submitted by 31 May 2024; or from B to D, if the essay is submitted by 7 June 2024.

The essay will be evaluated in 10 criteria, each providing between 1 and 5 points (see the table below). The final grade is made of the total score. A grade corresponds to the total of 45–50 points; B: 39–44 points; C: 32–38 p.; D: 25–31; E: 20–24; Fx: 13–19; F: 1–12. The course is passed for A, B, C, D, and E grades.

Suggested Literature:

Bowler, Peter J., and Iwan Rhys Morus. *Making modern science: A historical survey*. University of Chicago Press, 2010.

Ede, Andrew. *Technology and society: a world history*. Cambridge University Press, 2019.

Edgerton, David. *The Shock of the Old: Technology and Global History since 1900*. New York: Oxford University Press. 2007.

Latour, B. (1999). "Circulating reference: Sampling the soil in the Amazon forest". In B. Latour, *Pandora's hope: Essays on the reality of science studies* (pp. 24-79). Harvard University Press.

Slotten, Hugh Richard, Ronald L. Numbers, and David N. Livingstone, eds. *The Cambridge history of science: volume 8, modern science in national, transnational, and global context*. Cambridge University Press, 2020.

Essay structure	1 point	3 points (or + 2 additional points)	4 points (or + 1 additional point)	5 points (or + 1 additional point)
1. Introduction	Presents a vaguely formulated problem (“knowledge gap”) related to the field of history of S&T	Presents a well-defined problem related to the field of history of S&T	+ this problem is socially important	+ this problem is innovative (or engaging)
2. Argument (thesis)	is clearly formulated. ,	+ addresses the wider problem,	+ it is built on different claims (has sufficient detalization),	+ it is counter-intuitive.
3. Concept, method & sources used to prove the argument	The conceptual framework is defined,	+ The argument/claims are supported by 2 or more different sources,	+ The method used for the analysis of sources (1 or more) is clearly defined,	+ There are two methods used to analyse 1 or more sources.
4. The limits & weak points of the argument	Limits of the argument are well-defined,	+ weak-points of the claims or are defined,	+ weak-points of the concept or of the method or of the sources are defined,	+ some weak-points are addressed with counter-critique.
5. Conclusions	Summary the argument,	+ Summary its strongest proves,	+ address the wider problem stated in the introduction,	+ elaborate wider consequences (for the field of history of S/T, for society).
6. Structure & abstract	The text has an identifiable structure, with introduction, body & conclusion,	+ The text has a well-chosen subheadings,	+ Outlined micro-structure in the course PM was fully completed,	+ The essay is accompanied by a short abstract (under 150 words).
7. Coherence	Each paragraph is designed around one overarching idea,	+ Each paragraph has an introductory sentence and concluding sentence,	+ Each part of the text has mini-introduction and mini-conclusion,	+ The text is coherent and all its parts are logically connected to each other.
8. Language	Language errors & very long phrases. The text is difficult to read,	Formalities and design show no major flaws,	Linguistic rigor: few or no language errors. The text is designed without major errors,	Linguistic rigor. The text is designed in a way that favours understanding.

9. References	The essay contains irrelevant references ,	+ The essay contains 3 or more relevant references ,	+ Citations consistently follow a clear system ,	+ Well-designed bibliography (covering well the subject of discussion).
10. Title & figures	An accurate & unique title corresponding to the content of the essay or its argument	+ the title is clear & memorable	+ the text has 1 figure (properly discussed) in the paper).	+ the text has 2 or more figures (properly discussed) in the paper).

Contacts

Communication in the course

For questions about the course, you are welcome to contact the course responsible or the respective teacher.

Course responsible

Aliaksandr Piahana, Division of History of Technology, Science and Environment.
piahana@kth.se

Other contacts

Per Högselius: per.hogselius@abe.kth.se
Erik Ljungberg: ljueri@kth.se

Help with registration and the like: kursexp@abe.kth.se