

# **History of Science and Technology**

## **AK1202 (7.5 hp)**

Division of History of Science, Technology and Environment, KTH

**Version 2, 22 January 2025**

### **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 five 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 scholars of science and technology studies 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 1500. Throughout the course, we will ask two fundamental questions in relation to modern Europe: How much did science and technology determine the social order in that region? And to what extent have local 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 and society, and, most importantly, teach some skills in critical thinking that the students can use outside the classrooms.

## 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 **12 sessions and 11 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 500 words (with the exception of the final essay, which should be under 1,000 words). By preparing an assignment essay (& receiving feedback from a teacher), students will improve their skills in writing the final essay. Therefore, submitting an assignment on time will make easier for teacher to provide a feedback on it – this could help the student to progress. Home assignments will be graded with Pass/Fail note. 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. 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 or group 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 assessment table at the end of the PM.

The final essay must not exceed 1,000 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 28 April 2025. Late submission will result in a lower grade, but no essays will be accepted after 12 May 2025.

## Schedule

**Thu 16 Jan 13:15-15:00** (Location: E2, Lindstedstvågen)

**Teacher: Aliaksandr Piahnanu**

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

*Assignment 1 (due before 21 Jan 2025 on Canvas) Form a group of 3-5 people and think about which technology was the most important human invention of all time. Write an essay (up to 500 words) arguing for the importance of this technology, but also showing how this technology has changed human conditions (for better or worse; in the long or short term past). If possible, include any numerical estimates of its impact to prove your point. Provide sources to support your claims. All group members should submit their essays separately, but make your essay anonymous - don't include your name in your essay.*

**Wed 22 Jan 13:15-15:00** (Location: U51, Brinellvägen)

**Teacher: Aliaksandr Piahnanu**

Speaking about science & technologies make us thinking about novelty. This perspective is very misleading. **Session 2** will examine the promise of “techno-scientific progress” and the old technologies that surround us.

*Assignment 2 (due before 28 Jan 2025 on Canvas). Your task is to write an individual analytical essay (max. 500 words) on a specific issue related to the topic of the history of science & technology. The essay should have an introduction, a body and a conclusion and should be centred around a concrete research question that your essay seeks to answer. The answer you give in the essay (= your argument) should be supported by at least 2 scholarly publications. Anonymise your essay.*

**Wed 29 Jan 13:15-15:00** (Location: Salongen)

**Teacher: Aliaksandr Piahnanu**

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 1500.

*Assignment 3 (submit before 4 Feb): Form a group of 3-5 peoples. Choose any actor related to the history of science & technology and make together a poster on a concrete historical source that you can rely on to study this actor: a newspaper article, archival material, a document, an object. Your poster should describe the origin of the source, who created it and for what purpose, analyse what kind of information it reveals about the actors your group is interested in and how trustworthy your conclusions are. The poster information shall be backed by at least 2 scholarly publications. If you wish, and if there is time during the next two sessions, you could present this poster to the class.*

**Wed 5 Feb 13:15-15:00** (Location: U51, Brinellvägen)

**Teacher: Aliaksandr Piahnanu**

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 4 (submit before 11 Feb): Freely select and read 3 short scholarly publications (papers, articles, or book chapters) on a topic from the last lectures (science in international relations;*

*technological determinism; theories of science & technology) that interests you. You will then write a short essay (up to 500 words) on the texts you have read. Your essay should compare either arguments, concepts, evidence or claims of the selected scientific publications. Anonymise your essay.*

**Wed 12 Feb 13:15-15:00** (Location: Salongen)

**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 5** 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 5 (by 19 Feb - for session 6 by Nuno Marques): Please read the MOO poem and watch the performance figuring out how gender is performed in them. And please read the chapter “Technogender” by Preciado because it will give body (pun intended!) to our discussions. While you do this, write down your reactions, comments, questions, observations and bring it with you for the session on 19 February. Keep your text under 200 words (not essays but starting points, notes, intentions, exclamations). References:*

- Preciado, Paul B. “Technogender”. *Testo Junkie: Sex, Drugs and Biopolitics in the Pharmacopornographic Era*. Feminist Press, 2013, pp. 99-130 (pdf in Canvas);
- Reilly, Evelyn. “MOO”. *Echolocation*. Roof Books, 2018, pp. 105-120 (pdf in Canvas).

**Wed 19 Feb 13:15-15:00** (Location: U51, Brinellvägen)

**Teacher: Nuno Da Silva Marques**

The **session 6** is called “technobodies” and the students need to read the poem MOO and the chapter “Technogender” by Preciado (uploaded on Canvas) to have access to feminist critiques of technoscience with a focus on the concept of gender, and the argument of bodies as technologies. You need to write a 200 word reflection about the texts and bring it to the classroom (as part of the assignment 4). These notes would allow you to discuss the texts and your impressions with other students.

*Assignment 6 (by 19 March - for the session 6 with Oscar Hartman Davies): Find one example of a ‘smart’ intervention and critically reflect on it. This can be anything from ‘smart meters’ in the home, to large-scale Smart City initiatives and anything in between. Please come to the class ready to present briefly (2-3 minutes) on the following points: What ‘problem’ is this intervention intended to solve and how is this problem framed? Who are the main actors/stakeholders involved in this intervention and what is their role? What are 1 or 2 limitations you can perceive in this intervention? There is no need to upload your reflexions on Canvas. You can consult the following literature before the session 6:*

- Bakker, K. and Ritts, M. 2018. *Smart Earth: A meta-review and implications for environmental governance*. *Global Environmental Change*, 52: 201-211. <http://doi.org/10.1016/j.gloenvcha.2018.07.011>
- Halpern, O., Robert Mitchell, and Bernard Dionysius Geoghegan, “The Smartness Mandate: Notes toward a Critique,” *Grey Room*, no. 68 (Summer 2017): 106–129. <https://www.greyroom.org/issues/68/72/the-smartness-mandate-notes-toward-a-critique/>
- Lehman, J. 2018. *From ships to robots: The social relations of sensing the world ocean*. *Social Studies of Science*, 48(1), 57–79. <https://doi.org/10.1177/0306312717743579>

**Wed 19 March 13:15-15:00** (Location: Salongen)

**Teacher: Oscar Hartman Davies**

For the **session 7**, we will talk about Smart Earth is an innovative approach to environmental monitoring and governance, involving diverse networks of environmental sensors, ICT, and governmental, non-governmental, and corporate stakeholders. It draws on a longer history of both ‘smart environments’, notably smart

cities, and ‘smartness’ as a techno-managerial ideal.

*Assignment 7 (submit before 25 March): Freely select and read 3 short scholarly publications (papers, articles or book chapters) on a topic from the previous lectures that interests you. You will then write a short historical essay (up to 500 words) – an essay describing how something changed or happened in the past. Your main task is to build an argument based on the information you have found in the texts you have read. You can combine, compare or contrast their claims. At the end, the essay should contain your own argument, supported by claims and evidence. The essay should be divided into 3 parts: introduction (presenting a particular problem and/or research question), body (stating your argument, exemplified by the claims & evidence), and conclusions (showing how your argument changes the understanding of the problem). Anonymise your essay.*

**Wed 26 March 13:15-15:00** (Location: U51, Brinellvägen)

**Teacher: Sonali Huria**

In what ways have gendered bodies been implicated in the histories of science and technology? From the ‘mothers of gynecology’ – enslaved Black women who served as subjects of experimental surgeries for developing childbirth techniques in 19th century America, to the women radium-dial painters in the 1910s, and Indian-origin women in the UK in the 1960s fed radioactive-rotis (flatbreads) as part of research trials, gendered and racialized bodies have been thoroughly enmeshed with scientific advancements and their varied applications. **Session 8** will explore such cases as a means to unravel how ‘gendered’ bodies come to be sites of techno-scientific knowledge production.

*Assignment 8 (submit before 2 April). Choose a topic related to the history of S&T, which does not have article about it on Wikipedia in English. It might be a person, event, object, idea or phenomenon. This topic than might become the focus of your final essay. Select and read 3 short scholarly publications (research papers, articles or book chapters written by scholars) on this topic and write a short encyclopaedic (descriptive) entry (up to 500 words) about it. Back up the information in this entry by citing your sources. Consider writing the entry in a way to upload it on Wikipedia.*

**Tue 2 April 13:15-15:00** (Location: U51, Brinellvägen)

**Teacher: Aliaksandr Piahnanau**

Many technological innovations are associated with military. What is the historical relation between war, technologies and science? **Session 9** will discuss how techno-science affected warfare and peace, 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.

*Assignment 9 (submit before 8 April). Prepare a draft for the final essay. Select and read 3 to 5 short scholarly publications (papers, articles or book chapters) on a topic of history of S&T that interests you. This topic and these texts can be already used in your previous assignments. Write a short historical essay (up to 500 words) based on the texts you have read. Most importantly, the essay should contain your own argument, supported by claims and evidence. But it should also discuss limits of your argument. For example, you might consider the following questions: To what extent your conceptual focus fits the topic you have chosen? Are there any contradictions between the argument and the claims? Can you offer any alternative argument based on your the claims or evidence? How representative and direct is your evidence in relation to the argument? As usual, the essay should have 3 parts: introduction (presenting a particular problem and/or research question), body (stating your argument, exemplified by the claims & evidence), and conclusions (showing how your argument changes the understanding of the problem). Bring your essay with you for session 9 April.*

**Wed 9 April 13:15-15:00** (Location: U51, Brinellvägen)

**Teacher: Aliaksandr Piahnanau**

The essence of the historical profession is to describe the past based on “historical sources” in a scholarly publication. **Session 10** will focus on a variety of sources that historians employ to “reconstruct the past” and on the ways they try to communicate findings in academic papers and to get it through peer-review. This session is aimed at helping the students to produce a high quality final essay.

*Assignment 10 (submit by 15 April). Prepare an oral presentation (lasting under 5 minutes) of your final essay & a power point with max 5 slides to explain the problem your essay is dealing with; the research question, the argument, its evidence and the implications of your argument to the problem.*

**Tue 16 April 13:15-15:00** (Location: U51, Brinellvägen)

**Teacher: Aliaksandr Piahnanau**

*Oral presentations.* During **session 11** students will present their research projects, consisting of an introduction to the topic, research questions, argument and evidence, and conclusion. Students will also give critical feedback on their peers' presentations.

**Tue 17 April 13:15-15:00** (Location: U51, Brinellvägen)

**Teacher: Aliaksandr Piahnanau**

*Oral presentations.* During **session 12** students will present their research projects, consisting of an introduction to the topic, research questions, argument and evidence, and conclusion. Students will also give critical feedback on their peers' presentations.

*Assignment 11 (due by 28 April): Rework your draft essay taking into account critic you received during the oral presentation & submit the final essay version (under 1,000 words excluding references).*

**The final mark** for the course will be composed of the evaluation of the final essay (100%). Only the final essay submitted on time might receive A grade. Any late submission (starting from 29 April 2025) 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 5 May 2025; or from B to D, if the essay is submitted by 12 May 2025.

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 over 45 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.
- Harari, Yuval Noah. *Sapiens: A Brief History of Humankind*. New York: HarperCollins Publishers, 2015
- Kuhn, Thomas S. *The structure of scientific revolutions*. Chicago: University of Chicago press, 1997.
- 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.
- Bakker, K. and Ritts, M. 2018. Smart Earth: A meta-review and implications for environmental governance. *Global Environmental Change*, 52: 201-211. <http://doi.org/10.1016/j.gloenvcha.2018.07.011>
- Halpern, O., Robert Mitchell, and Bernard Dionysius Geoghegan, "The Smartness Mandate: Notes toward a Critique," *Grey Room*, no. 68 (Summer 2017): 106–129. <https://www.greyroom.org/issues/68/72/the-smartness-mandate-notes-toward-a-critique/>
- 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.
- Lehman, J. 2018. From ships to robots: The social relations of sensing the world ocean. *Social Studies of Science*, 48(1), 57–79. <https://doi.org/10.1177/0306312717743579>
- Preciado, Paul B. "Technogender". *Testo Junkie: Sex, Drugs and Biopolitics in the Pharmacopornographic Era*. Feminist Press, 2013, pp. 99-130 (pdf in Canvas);
- Reilly, Evelyn. "MOO". *Echolocation*. Roof Books, 2018, pp. 105-120 (pdf in Canvas)

## Assessment table for grading the final essay

Essay structure	1 point	3 points (or + 2 additional points)	4 points (or + 1 additional point)	5 points (or + 1 additional point)
<b>1. Introduction</b>	Presents a <b>vaguely formulated problem</b> (“knowledge gap”) related to the field of history of S&T	Presents a <b>well-defined problem</b> related to the field of history of S&T	+ this problem is <b>socially important</b>	+ this problem is <b>innovative</b> (or engaging)
<b>2. Argument (thesis)</b> (multiply points by 2)	is <b>clearly formulated</b> ,	+ it is <b>built on different claims</b> (has sufficient detalization),	+ addresses the <b>wider problem</b> ,	+ <b>it is counter-intuitive</b> .
<b>3. Concept &amp; methods used to prove the argument</b> (multiply points by 2)	The <b>conceptual framework</b> is defined,	+ Theoretical part sufficiently detalised,	+ <b>1 method</b> used for selecting or analysing sources (1 or more) is <b>clearly defined</b> ,	+ There are <b>2 methods</b> used & defined to collect &/or analyse 1 or more sources.
<b>4. The limits &amp; weak points of the argument</b>	<b>Limits of the argument</b> are well-defined,	+ <b>weak-points of the argument/claims</b> are defined,	+ <b>weak-points of the concept or of the method or of the sources</b> are defined,	+ some weak-points are addressed with <b>counter-critique</b> .
<b>5. Conclusions</b>	<b>Summary</b> the argument,	+ <b>elaborate wider consequences</b> (for the field of S&T, for society)	+ <b>address the wider problem</b> stated in the introduction,	+ summary the strongest proves.
<b>7. Coherence</b> (can use AI)	Each <b>paragraph</b> is designed <b>around one overarching idea</b> ,	+ Each <b>paragraph has an introductory sentence and concluding sentence</b> ,	+ Each <b>part of the text has mini-introduction and mini-conclusion</b> ,	+ The text is <b>coherent</b> and all its <b>parts are logically connected</b> to each other.
<b>7. Structure &amp; abstract</b> (divide points by 2)	The text has an <b>identifiable structure</b> , with introduction, body & conclusion,	+ <b>Micro-structure</b> of the course PM was <b>fully completed</b> ,	+ The text has a well-chosen <b>subheadings</b> ,	+ The essay is accompanied by a short <b>abstract</b> (under 150 words).
<b>8. Language</b> (divide points by 2) (can use AI)	+ The text contains a <b>joke</b>	Formalities and design show <b>no major flaws</b> ,	<b>Linguistic rigor</b> : few or no language errors. The text does not have major errors,	Linguistic rigor. The text is designed in a way that <b>favours understanding</b> .
<b>9. Sources</b> (divide points by 2)	+ Statements backed up by <b>citing sources</b> ,	+ Argument/claims are supported by <b>2 or more different kinds of sources</b> ,	+ Citations follow a <b>clear consistent system</b> ,	+ <b>Well-designed bibliography</b> (covering well the subject of discussion).
<b>10. Title &amp; figures</b> (divide points by 2)	An <b>accurate &amp; unique title</b> corresponding to the content of the essay or its argument,	+ the title is clear & <b>memorable</b> ,	the text has <b>1 figure (properly discussed)</b> in the paper),	the text has <b>2 or more figures (properly discussed)</b> 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](mailto:piahana@kth.se)

#### Other contacts

Nuno Da Silva Marques: [marques.nuno@icloud.com](mailto:marques.nuno@icloud.com)

Oscar Hartman Davies: [oscarhd@kth.se](mailto:oscarhd@kth.se)

Sonali Huria : [huria@kth.se](mailto:huria@kth.se)

Per Högselius: [per.hogselius@abe.kth.se](mailto:per.hogselius@abe.kth.se)

Adam Wickberg: [adam.wickberg@abe.kth.se](mailto:adam.wickberg@abe.kth.se)

Help with **registration** and the like: [kursexp@abe.kth.se](mailto:kursexp@abe.kth.se)