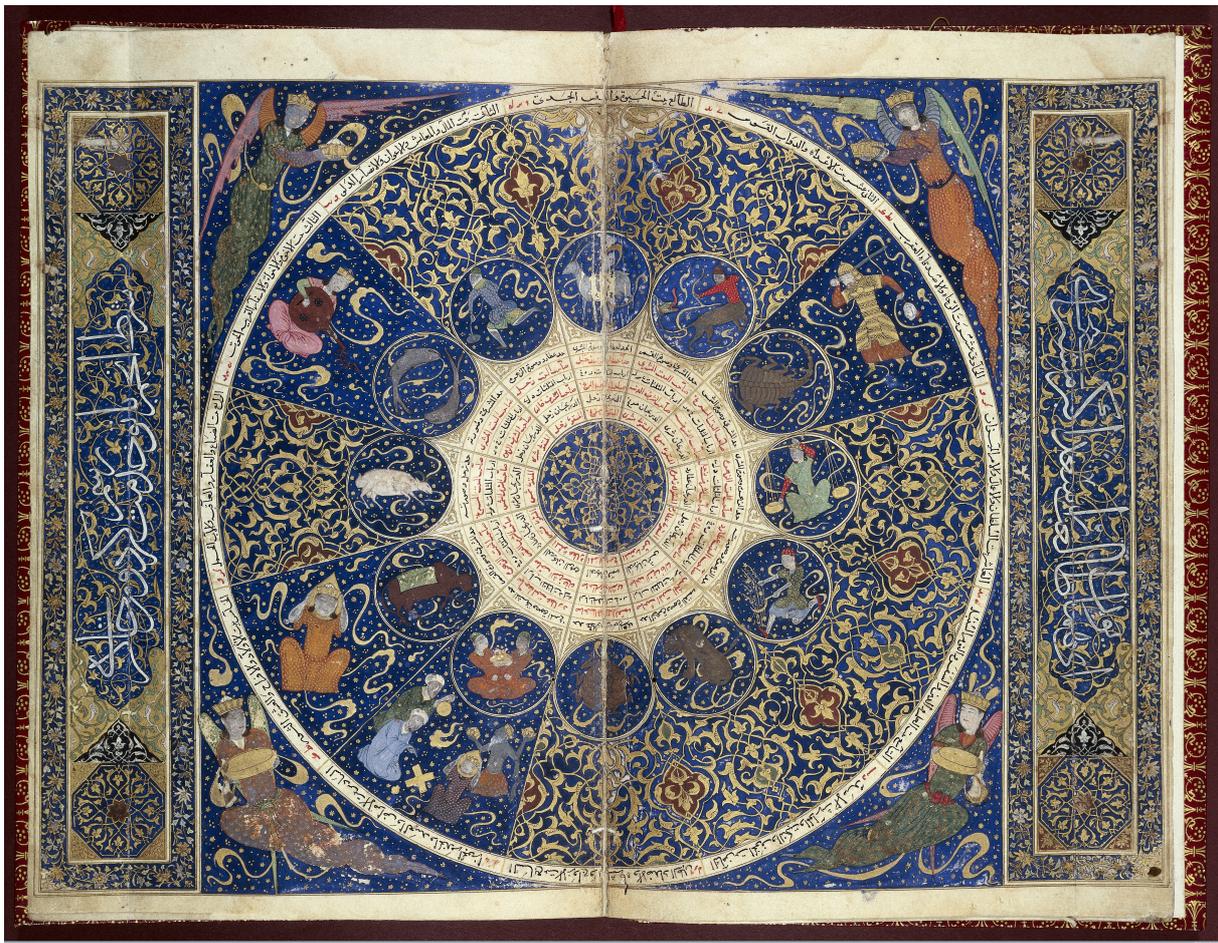


# HST 123

## Introduction to the History of Science and Technology

Fall 2018  
Schedule: MWF 9.00-9.50  
Room: 8.302

Professor: Clare Griffin  
clare.griffin@nu.edu.kz  
Office: 8.402  
Office hours:  
Wednesday 11:00-12:00  
Wednesday 15:00-16:00  
Or by arrangement.



*Nativity (horoscope calculated for the day of birth) of Prince Iskandar, grandson of Tamerlane. Prince Iskandar was born 25th April 1384.*

### Course Description:

This course takes a long and a broad view of the history of science and technology. Starting in Ancient Babylon, we end on Twitter, having considered astronomy and astrology, magic, the space race, and much besides. The course sets modern science in the context of much earlier developments, many of which look very different to science today, and yet were vital to its emergence. For every period, source, and phenomenon we consider, we will question how and why it should be considered scientific. Students will be expected to approach each period

with the aim of understanding why certain practices made sense to historical figures, even if they do not make sense to us.

**Course Aims:**

- 1) To provide students with a basic knowledge of the long term history of science and technology in a global context.
- 2) To familiarize students with the major scholarly debates surrounding the history of science and technology, and with the different ways historians of science, medicine, and also historians of trade, exploration, economics, and art have tried to understand historical scientific practices and technologies.
- 3) To enhance students' critical thinking and writing abilities, in particular with regards to interpreting a wide range of primary source materials as well as secondary literature, and the use of these in constructing an essay.
- 4) To develop students' research and presentation skills through leading seminar discussions.

**Course Learning Outcomes (CLOs):**

By the end of the course the student will be expected to:

- 1) Demonstrate an awareness of the world's major scientific traditions, and of the myriad social, political, economic, and cultural forces and factors that have guided their evolution and interactions with each other over time. [A1, A2]
- 2) Exhibit knowledge of how to critically analyze primary and secondary sources, and of how to use these in the construction of an argumentative historical essay. Analyze and interpret primary sources. [B1, B2, B3, B4]
- 3) Display an ability to examine unfamiliar cultural beliefs and practices in an empathetic, non-judgmental fashion, and to convey an appreciation for the world's diverse systems of technological thought and behavior. [C4]
- 4) Lead a discussion on a set of primary or secondary sources, presenting their essential features, bring in your own interpretations, and encouraging others to present different views. [C2]

**Class Policies:**

**Attendance:**

You are expected to attend every class and arrive on time. Excessive absences will lower your attendance grade, and limit your ability to succeed in the course. If you miss class for any reason, including medical emergencies, it will be counted as an absence. It is your responsibility to collect notes from other students for the class session(s) that you miss. If you are more than 5 minutes late to class, you will be counted as absent. See below on how attendance is factored into grades.

**Participation:**

Students are expected to participate in class, especially in seminars. Seminars will focus on the assigned reading, so it is expected that all students will arrive at class fully prepared to discuss the text. Failure to prepare for seminars, or to participate in the discussion, will result in a penalty. See below on how participation is factored into grades.

**Groupwork:**

During the term, students will be assigned to small groups (3-4 people), and allocated a seminar. That group will be expected to collectively present that week's reading to the rest of the group, and take an active role in leading the resulting discussion. I will present the readings and lead the discussion for the first couple of weeks to provide a model for this.

**Quizzes and Online Assignments:**

At irregular periods during the term, you will be asked to complete quizzes in class, or complete an online assignment out of class. These will be based on lectures, seminar discussions, or assigned readings already completed. You will be allowed your own notes (but not copies of readings) for these quizzes.

**Essays:**

Students must write three essays.

Here are some general points on essay writing for this class:

An essay should be an attempt to answer a question based on a range of relevant material organized into a coherent argument. The list of possible questions for each essay is given below. You must refer to primary and secondary sources using one referencing style consistently applied (i.e. do not change reference style mid-way through an essay). The essay should clearly indicate the assignment title, your name, email address and page numbers. Excluding the bibliography, your essays should be within the word count ranges given below. Essays MUST be your own work. Any essay that bears suspicious similarity to a published work, internet article, the essay of another student, or any other work, will be flagged by the TurnItIn system and may come in for serious penalties.

**Word Count:**

You MUST write at least the minimum word count (see below). You can go over the maximum word count, but not by more than 10%. Word count includes footnotes and quotations, it excludes bibliographies.

**Readings for essays:**

In writing an essay, you MUST follow the guidelines below about reading and citing material. Anyone not following these guidelines will receive a D.

- You MUST cite the weekly essential readings. For essay one, you must cite at least one of the weekly readings. For essays two and three, you must cite at least three of the weekly readings.
- You MUST cite at least one article from the file 'Further Readings'.
- You CAN cite my lectures (specify Lecture: Title of Lecture, Date).
- You MUST NOT cite any material other than the material I have given you.
- You MUST include footnotes in your essay that indicate where you found certain information or arguments.

- You MUST include a bibliography, a list of what you used for your essay.
- Citations and the bibliography MUST follow Chicago Style (Notes and Bibliography). See here: [https://www.chicagomanualofstyle.org/tools\\_citationguide.html](https://www.chicagomanualofstyle.org/tools_citationguide.html)

### **Essay Questions:**

#### Essay 1:

Essay 1 is a worksheet. You will be provided with the worksheet at least 2 weeks before the deadline. It sets out the major structure of a humanities essay for you; you need to complete each section with relevant information. We will complete a mock worksheet on a different question together in class before you have to hand in this assignment, so you will have a chance to practice.

Word Length: No set length, but all sections of the worksheet must be completed in full sentences.

Question: “Were people in the Ancient World interested in mathematics primarily because it was vital for astronomy?”

#### Essay 2:

Word Length: 1,500-2,000 words

“Why did people in the pre-modern world design and make robots?”

#### Essay 3:

Word Length: 1,700-2,200 words

Question:

Choose ONE of the following:

Either

“Which groups of people made significant contributions to science in the early modern world?”

OR

“What was more important to shaping modern science – politics or religion?”

### **Submission of Essays:**

Essays must be submitted via Moodle by 8pm on the day of the deadline. Students will lose one full grade boundary for each part of day late up to a maximum of two days. For example, an essay submitted any time in the 24 hours immediately after the deadline that would receive an A grade for its quality would be marked down to a B; the same essay submitted between 24 and 48 hours after the deadline would be marked down to a C. Any essay submitted more than 48 hours after the deadline without prior permission for an extension will not be read, and the student will receive a 0 for that assignment.

### **Policy on Extensions:**

Extensions will only be granted due to serious circumstances. Reasons that may be considered for an extension include (but are not limited to) death of a family member and serious illness. Requests for extensions should usually be made 24 hours before a deadline, although exceptions may be considered for extreme circumstances. Extensions are typically for 48 hours. Extensions will usually only be granted when the student is prepared to produce some paperwork supporting the reason listed. Such paperwork must be submitted no later than one week following the original deadline for the piece of work. Reasons that will not be accepted for an extension include (but are not limited to) computer or other technical failure (students

are responsible for backing up their work, and NU has its own computer facilities for students), power outages, and multiple deadlines (students are made aware of deadlines substantially in advance, and should manage their time accordingly).

**Grading:**

Grades will be based on these components.

Attendance	5%
Participation	5%
Group Presentation	20%
Online Assignment	5%
Quizzes [4x5%]	20%
Essay 1	10%
Essay 2	15%
Essay 3	20%

These are the general grading criteria applicable to all assignments. **See also the file labelled 'NU Grade Scale' in Moodle.**

A	95%-100%	Excellent, exceeds the highest standards in the assignment or course
A-	90%-94.9%	Excellent; meets the highest standards for the assignment or course
B+	85%-89.9%	Very good; meets high standards for the assignment or course
B	80%-84.9%	Good; meets most of the standards for the assignment or course
B-	75%-79.9%	More than adequate; shows some reasonable command of the material
C+	70%-74.9%	Acceptable; meets basic standards for the assignment or course
C	65%-69.9%	Acceptable; meets some of the basic standards for the assignment or course
C-	60%-64.9%	Acceptable, while falling short of meeting basic standards in several ways
D+	55%-59.9%	Minimally acceptable
D	50%-54.9%	Minimally acceptable; lowest passing
F	0%-49.9%	Did not satisfy the basic requirements of the course

**Attendance Grading**

Attendance will be kept in Moodle. The percentage of attendance in that system will then be the numerical attendance grade, unless the recorded attendance is lower than 85%, in which case the attendance grade will be reduced to 0. Students are responsible for making sure that their attendance is recorded accurately in the system. They may ask for the attendance record to be corrected IF they can provide reasonable evidence of having attended a class for which they have been marked absent. They **MUST** make such a request **WITHIN TWO WEEKS** of the date of the class for which they have been marked absent; late requests will not be considered.

**Participation Grading:**

During this course students will be asked to work in groups during class, to discuss readings, debate a question, or similar. The participation grade will be based on the student's performance in these class exercises. If a student participates fully in discussions, and makes an effort to comment to the class as a whole, they will receive an excellent grade. Students who do not speak to classmates, do not engage with the assignment, or use their phones or laptops for reasons other than consulting class materials, will have their grade reduced.

**Essays Grading:**

These are more detailed criteria applicable to grading the essays.

A

As for A-, but with an excellent performance on all aspects.

A-

Essay is of appropriate length.

Attempts to answer the question using a broad range of primary and secondary sources.

Essays receiving this grade would often go beyond the essential reading list to bring in more relevant sources.

Weighs evidence for and against a specific viewpoint, and comes to an argued conclusion that strongly presents a view well-supported by the evidence.

B

Essay is of appropriate length.

Attempts to answer the question using a range of primary and secondary sources mostly taken from the essential reading list.

Weighs evidence for and against a specific viewpoint, and attempts to present a conclusion based on the evidence.

C

Essay is of appropriate length.

Attempts to answer the question using a limited range of primary and/or secondary sources entirely taken from the essential reading list.

Attempts to weigh evidence for and against a specific viewpoint.

D

Essays receiving this grade would usually fall into one or more of the following categories:

Being under the minimum word count, or more than 10% over the maximum word count.

Entirely fails to answer the set question.

Contains only basic information, with no attempt to construct an argument.

Cites materials other than those permitted (see above).

F

Failure to complete assignment, or submission of work that fails to meet the criteria for the course, or entirely fails to address the question.

## Academic misconduct policy

Academic and personal misconduct by any student in this course will be dealt with according to the requirements and procedures in the Student Code of Conduct for Nazarbayev University. Plagiarism and cheating will not be tolerated. Students should be familiar with the university's official statement on plagiarism:

Plagiarism is intentionally or carelessly presenting the work of another as one's own. It includes submitting an assignment purporting to be the student's original work which has wholly or in part been created by another person. It also includes the presentation of the work, ideas, representations, or words of another person without customary and proper acknowledgement of sources. Plagiarism occurs when a person:

1. Directly copies one or more sentences of another person's written work without proper citation. If another writer's words are used, you must place quotation marks around the quoted material and include a footnote or other indication of the source of the quotation. This includes cut and paste from the internet or other electronic sources;
2. Changes words but copies the sentence structure of a source without giving credit to the original source, or closely paraphrases one or more paragraphs without acknowledgement of the source of the ideas, or uses graphs, figures, drawings, charts or other visual/audio materials without acknowledging the source or the permission of the author;
3. Submits false or altered information in any academic exercise. This may include making up data for an experiment, altering data, citing nonexistent articles, contriving sources, etc.;
4. Turns in all or part of assignment done by another student and claims it as their own;
5. Uses a paper writing service, has another student write a paper, or uses a foreign language translation and submits it as their own original work.

(Nazarbayev University Student Code of Conduct)

### Essential Texts:

All essential readings, and readings for essays, will be provided via Moodle. For some weeks there will be more reading than others. You are always expected to come to class prepared, and quizzes will test both your knowledge of the lectures, and of the essential readings.

### COURSE SCHEDULE<sup>1</sup>

Date	Topic	Readings	Assignment
<b>Week 1</b>	What is Science?		
<b>13.08</b>	Introductions		
<b>15.08</b>	Lecture: What is Science?		
<b>17.08</b>	Seminar: Defining Science	"Introduction", McClellan III, James E., and Harold Dorn. <i>Science And Technology In World History: An Introduction</i> . JHU Press, 2015.	

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<sup>1</sup> I reserve the right to change this schedule, or the associated readings, as necessary.

*Science and Technology in the Ancient World*

Date	Topic	Readings	Assignment
<b>Week 2</b>	Living Creatures		
<b>20.08</b>	Lecture: Burying the Dead		
<b>22.08</b>	Lecture: The Animal Kingdom		
<b>24.08</b>	Seminar: Differing Classifications	Sterckx, Roel. "Animal classification in ancient China", <i>East Asian Science, Technology, and Medicine</i> 23 (2005): 26-53.	
<b>Week 3</b>	Measuring the World		
<b>27.08</b>	Lecture: Mathematics	Chapter 9, McClellan III, James E., and Harold Dorn. <i>Science And Technology In World History: An Introduction</i> . JHU Press, 2015.	
<b>29.08</b>	Lecture: Astronomy and Astrology		
<b>31.08</b>	CONSTITUTION DAY HOLIDAY		
<b>Week 4</b>	The Uses of Measures		
<b>03.09</b>	Seminar: Why HistSTM?		Online Assignment #AskAHistorianofHistSTM
<b>05.09</b>	Seminar: Comparing Mathematics		
<b>07.09</b>	Seminar: Mathematics and Astronomy	Plofker, Kim. "Links between Sanskrit and Muslim science in Jaina astronomical works." <i>International Journal of Jaina Studies</i> 6, no. 5 (2010): 1-13.	Group 1

*Science and Technology in the Medieval World*

Date	Topic	Readings	Assignment
<b>Week 5</b>	Useful Technologies		

<b>10.09</b>	Lecture: Military Technologies		Quiz 1
<b>12.09</b>	Lecture: Clocks and Time	McClellan III, James E., and Harold Dorn. <i>Science And Technology In World History: An Introduction</i> . JHU Press, 2015, pp. 146-56.	
<b>14.09</b>	Seminar: Cognitive Maps	Frake, Charles O. "Cognitive maps of time and tide among medieval seafarers." <i>Man</i> (1985): 254-270.	
<b>Week 6</b>	The Limits of Science		
<b>17.09</b>	Lecture: Magic		Essay 1
<b>19.09</b>	Lecture: Alchemy		
<b>21.09</b>	Seminar: Arabic Alchemy	Ferrario, Gabriele. "An Arabic Dictionary of Technical Alchemical Terms: MS Sprenger 1908 of the Staatsbibliothek zu Berlin (fols. 3r-6r)." <i>Ambix</i> 56, no. 1 (2009): 36-48.	Group 2
<b>Week 7</b>	Medieval Robots		
<b>24.09</b>	Lecture: Medieval Robots	Stephen Cave and Kanta Dihal, "Ancient dreams of intelligent machines: 3,000 years of robots," <i>Nature</i> 559 (2018), 473-475.	
<b>26.09</b>	Seminar: Medieval Robots Cont.	Chapter 1, Truitt, Elly Rachel. <i>Medieval robots: mechanism, magic, nature, and art</i> . University of Pennsylvania Press, 2015.	
<b>28.09</b>	Seminar: Monkbot	1) <a href="https://www.wnycstudios.org/story/317902-meet-monkbot/">https://www.wnycstudios.org/story/317902-meet-monkbot/</a> 2) <a href="https://blackbird.vcu.edu/v1n1/nonfiction/king_e/prayer_introduction.htm">https://blackbird.vcu.edu/v1n1/nonfiction/king_e/prayer_introduction.htm</a>	Group 3

### *Science and Technology in the Early Modern World*

Date	Topic	Readings	Assignment
<b>Week 8</b>	Science and Empire		
<b>01.10</b>	Lecture: The Imperial View		Quiz 2
<b>03.10</b>	Lecture: Local Knowledge		

Date	Topic	Readings	Assignment
<b>05.10</b>	Seminar: Andean Healing	Chapter 1, Crawford, Matthew James. <i>The Andean Wonder Drug: Cinchona Bark and Imperial Science in the Spanish Atlantic, 1630-1800</i> . University of Pittsburgh Press, 2016.	Group 4
<b>FALL BREAK</b>	<b>FALL BREAK</b>	<b>FALL BREAK</b>	<b>FALL BREAK</b>
<b>Week 9</b>	Places of Science		
<b>15.10</b>	Lecture: The Scientific Household	Shapin, Steven. "The invisible technician." <i>American scientist</i> 77.6 (1989): 554-563.	Essay 2
<b>17.10</b>	Seminar: The Workshop		
<b>19.10</b>	Seminar: Art and Science	Smith, Pamela H. "Art, science, and visual culture in early modern Europe." <i>Isis</i> 97, no. 1 (2006): 83-100.	Group 5

#### *Science and Technology in the Modern World*

Date	Topic	Readings	Assignment
<b>Week 10</b>	The Modern Scientific World		
<b>22.10</b>	Lecture: The Inanimate World	Chapter 15, McClellan III, James E., and Harold Dorn. <i>Science And Technology In World History: An Introduction</i> . JHU Press, 2015.	
<b>24.10</b>	Lecture: The Animate World		
<b>26.10</b>	Seminar: The Changing World	Elshakry, Marwa. "Muslim hermeneutics and Arabic views of evolution." <i>Zygon</i> ® 46.2 (2011): 330-344.	Group 6
<b>Week 11</b>	Machines and Modernity		
<b>29.10</b>	Lecture: Computing		Quiz 3
<b>31.10</b>	Lecture: Space!		
<b>02.11</b>	Seminar: Space and Geopolitics	MacDonald, Fraser. "Space and the atom: On the popular geopolitics of Cold War rocketry." <i>Geopolitics</i> 13, no. 4 (2008): 611-634.	Group 7

Date	Topic	Readings	Assignment
<b>Week 12</b>	Science, Technology, and Society		
<b>05.11</b>	Lecture: Science and the State	Solovey, Mark. "Science and the state during the Cold War: Blurred boundaries and a contested legacy." (2001): 165-170.	
<b>07.11</b>	Lecture: Science and Race		
<b>09.11</b>	Seminar: Science and Society	Milam, Erika Lorraine. "Men in groups: anthropology and aggression, 1965–84." <i>Osiris</i> 30.1 (2015): 66-88.	Group 8
<b>Week 13</b>	The Limits of Modern Science		
<b>12.11</b>	Lecture: Pseudo-Science	Gordin, Michael D. "How Lysenkoism Became Pseudoscience: Dobzhansky to Velikovsky." <i>Journal of the History of Biology</i> 45, no. 3 (2012): 443-468.	
<b>14.11</b>	Lecture: Sci-Fi		
<b>16.11</b>	Seminar: Sultana's Dream	1) Sultana's Dream - <a href="http://digital.library.upenn.edu/women/sultana/dream/dream.html">http://digital.library.upenn.edu/women/sultana/dream/dream.html</a> 2) <a href="http://histscifi.com/essays/murphy/sultanas-dream">http://histscifi.com/essays/murphy/sultanas-dream</a>	Essay 3

*Science and Technology and the History of Science and Technology*

Date	Topic	Readings	Assignment
<b>Week 14</b>	#HistSTM		
<b>19.11</b>	Seminar: #Twitterstorians		
<b>21.11</b>	Final Discussion: Is HistSTM important?		
<b>23.11</b>			Quiz 4