



Syllabus Course Program



HISTORY OF SCIENCE AND TECHNOLOGY

Specialty

According to EP

Institute

Social and Humanitarian Technologies

Educational program

Department

Ukrainian Studies, Cultural Studies and History of Science (310)

Level of education

Bachelor's level

Course type

General, Obligatory

Semester

According to distribution of the teaching workload

Language of instruction

English

Lecturers and course developers



Maryna Gutnyk

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PhD in Historical Sciences, Associate Professor, Associate Professor of Ukrainian Studies, Cultural Studies and History of Science Department

Authored and co-authored over 130 scientific and methodological publications. Senior lecturer of courses “History and Culture of Ukraine”, “History of science and Technology”, “History of NTU “KhPI”

More about the lecturer on the department's website

<http://web.kpi.kharkov.ua/ukin/vikladachi>



Serhii Radohuz

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PhD in Historical Sciences, Associate Professor, Associate Professor of Ukrainian Studies, Cultural Studies and History of Science Department

Authored and co-authored over 100 scientific and methodological publications. Senior lecturer of courses “History and Culture of Ukraine”, “History of science and Technology”

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General information

Summary

The discipline covers the evolution of science and technology throughout history until the contemporary era. Through this course, students will become familiar with significant figures and key advancements in the lives and endeavors of notable scientists and engineers. Particularly, they will develop the ability to thoughtfully evaluate these individuals' impacts on the progress of both Ukrainian and global science.

This objective will be accomplished through the creation of a research paper, wherein students will explore a suggested or personally chosen subject presented in the form of an abstract.

Course objectives and goals

The purpose of the discipline "History of Science and Technology" - is to promote the formation of a holistic scientific worldview in understanding the patterns of development of science and technology as a unique historical and cultural phenomenon

Format of classes

Lectures, workshops, self-study

Competencies

C08. The ability to preserve and multiply moral, cultural, scientific values and achievements of society based on an understanding of the history and patterns of development of the field, its place in the general system of knowledge about nature and society and in the development of society.

Learning outcomes

PR13. Understanding chemical engineering as a component of modern science and technology, its place in the development of engineering, the Ukrainian state and world culture.

Student workload

The total volume of the course is 90 hours (3 ECTS credits): lectures - 16 hours, Workshops - 16 hours, self-study - 58 hours.

Course prerequisites

History and culture of Ukraine

Features of the course, teaching and learning methods, and technologies

Interactive lectures with presentations, discussions, individual work (abstract) and teamwork (historical reconstruction using elements of gamification), research work. Study materials are available to students through OneDrive.

Program of the course

Topics of the lectures

Topic 1. Introduction to the history of science and technology

1. The subject, purpose, objectives and structure of the course.
2. The emergence of primordial knowledge about man and the environment in the Ancient World.

Topic 2. The Age of Antiquity and the Middle Ages in the History of Science and Technology

1. The main directions and stages of ancient natural philosophy.
2. Features of the development of scientific knowledge and technological progress of the Middle Ages.

Topic 3. The science of modern times

1. The essence, defining features and periodization of the revolution in science.
2. The achievements of scientists in the field of astronomy, mechanics, mathematics, physics, optics, chemistry, and medicine.

Topic 4. The development of science and technological progress in the XVIII century

1. The main directions of scientific research.
2. Technical progress and the beginning of the industrial revolution.

Topic 5. Science at the stage of industrial revolution

1. The main scientific achievements of the XIX century: the development of mathematics, classical physics, the origin of modern chemistry, the systematization of knowledge in biology.
2. The interconnection of science, industry and the emergence of new forms of educational institutions

Topic 6. Formation of non-classical science

1. Scientific revolution in natural science. Electrodynamical picture of the world.
2. The directions of development of science and technology in the late 19 - early 20 century.

Topic 7. The integrative nature of the development of science and technology

1. The concept of NTR. Its essence. Periodization.
2. Trends in the development of science and technology in the 21 century.

Topic 8. History of the NTU "KhPI"

1. Formation of the Kharkiv Technological Institute as a scientific and educational institution in the first decades of its activity.
2. Scientific achievements and educational model of the 20s - 80s of the 20 century.
3. NTU "KhPI" in the late 20 - early 21 century.

Topics of the workshops

- Topic 1. Science and Technology as a Historical and Cultural Phenomenon. The Initial Stage of Formation
- Topic 2. Scientific and Technical Knowledge of Antiquity and the Middle Ages
- Topic 3. Science and Technology in the 17th Century
- Topic 4. Defining Characteristics of Science and Technology in the 18th Century
- Topic 5. Technological Progress in the 19th Century
- Topic 6. Technological Achievements of the First Half of the 20th Century
- Topic 7. Science and Technology in the 21st Century
- Topic 8. Stages of Development of the National Technical University 'Kharkiv Polytechnic Institute'

Topics of the laboratory classes

no laboratory classes.

Self-study

1. The Role of Science in the Progress of Human Civilization.
2. Emergence of Natural Sciences in Ancient Civilizations.
3. Chemistry and Medicine in Ancient Egypt, Mesopotamia, India, and China.
4. Development of Mathematical and Astronomical Knowledge in Antiquity.
5. Scientific Contributions of Aristotle and Archimedes.
6. Alchemy in the Ancient World.
7. Arab Medieval Science.
8. Preconditions for the Scientific Revolution of the Early Modern Period.
9. Outstanding Mathematicians of the Late 16th to 17th Centuries.
10. Scientific Achievements of Galileo Galilei, René Descartes, and Isaac Newton.
11. Scientific and Engineering Activities of Leonardo da Vinci.
12. The Influence of Mechanics and Other Sciences in the 18th Century.
13. Development of Chemistry in the 18th Century. Achievements of A. Lavoisier.
14. Characteristics of the Industrial Revolution in Leading Countries.
15. Electromagnetic Theory of Faraday-Maxwell and the Scientific Worldview.
16. World's Fair as a Means of Scientific Connections Revival.
17. Higher Technical Educational Institutions in Ukraine as Centers of Scientific Thought.
18. The Scientific Legacy of the Curie Family.
19. Revolution in Physics at the Turn of the 19th and 20th Centuries.
20. Notable Ukrainian Scientists of the early 20th Century.
21. Development of Military Technology from the Late 19th to Early 20th Century.
22. History of Computing Technology, Periodization, and Characteristics.
23. Development of Modern Technologies Worldwide.
24. Prospects for the Development of Technical Sciences in the 21st Century.
25. Notable Scientific and Technical Achievements in the Early 21st Century.
26. Use of Nuclear and Chemical Weapons.

27. The Phenomenon of Professor V.L. Kyrpychov as a Rector Among Other University Rectors.
28. Activities of NTU "KhPI" During the German Occupation.
29. History of the Graduation Department (Student's Choice).
30. Scientists of KhTI Institute and their participation in mineral exploration in the territory of modern Ukraine
31. Activities of A. Mevius, K. Zvorykin.

Course materials and recommended reading

1. Tkachenko S. History of Science and Technology : tutorial / Tkachenko S., Gutnyk M., Sadkovska V. Kharkiv : NTU "KhPI", 2020. 114 p. <https://repository.kpi.kharkov.ua/handle/KhPI-Press/48965>
2. Gapochenko Svitlana, Gutnyk Maryna, Tkachenko Svitlana The problem of "technocratism" in higher technical education and the role of "History of science and technology" course in the formation of the spiritual values of the engineer. Матеріали III всеукраїнської науково-практичної конференції «Неперервна освіта для сталого розвитку: філософсько-теоретичні контексти та педагогічна практика» (Дніпро, 4 грудня 2020 р.) КЗВО «ДАНУ» ДОР». Дніпро: СПД «Охотнік», 2021. с. 91–93.
3. Gutnyk M., Radohuz S. The impact of decisions of Mining Industrialists Congresses on the Industrial Revolution increasing in Ukraine in the late XIX century. History of science and technology, 2020, vol.10, iss. 1 (16), p. 50–61. doi:10.32703/2415-7422-2020-10-1(16)-50-61
4. Gutnyk M., Chrzan K.L. Beckmann's family contribution to the development of European motor transport at the beginning of XX century. Часопис української історії. Київ, 2019. Вип. 39. С. 136-141. <https://repository.kpi.kharkov.ua/handle/KhPI-Press/48125>
5. Tverytnykova Elena, Gutnyk Maryna, Salata Halyna. Professors of the Kharkiv Technological Institute: unknown pages of biography History of science and technology, 2020, Vol. 10, iss. 2, p. 383–399 <https://repository.kpi.kharkov.ua/handle/KhPI-Press/52693>
6. Larin A. A., Gutnyk M. V., Tkachenko S. S., Horielova S. O. The contribution of Kharkiv enterprises to the rocket and space industry development. Space Science and Technology. 2021. 27, № 4 (131). С. 83–90. <https://doi.org/doi.10.15407/knit2021.04.083> <https://repository.kpi.kharkov.ua/handle/KhPI-Press/54173>
7. Gutnyk M., Tverytnykova O. The contribution of technological institute teachers to the transformation of the architectural space of Kharkiv city. Studies in History and Philosophy of Science and Technology, 2022, Vol 31 (2), pp. 48–61.
8. Tverytnykova E.E., Gutnyk M.V., Salata H.V. Ecological urban planning of Ukrainian cities in the late 19th – early 20th cent.: tram traffic and research in the field of electric traction (to the 130th anniversary of the 1st electric tram in Ukraine). Сторінки Історії, 2022, № 55, 24-45 <https://doi.org/10.20535/2307-5244.55.2022.269592>
9. Tverytnykova Elena, Gutnyk Maryna. Abram Slutskin and Radiophysics in Ukraine of the First Half of the 20th Century: World Dimension. *Studia Historiae Scientiarum*, 2022, 21, 397-420. <https://doi.org/10.4467/2543702XSHS.22.012.15978>
10. Maryna Gutnyk, Elena Tverytnykova, Yulia Demidova. Transistors. Do American scientists really have priority? 2022 IEEE 2nd Ukrainian Microwave Week, November 14th–18th, 2022 Paper Collection <https://doi.org/10.1109/UkrMW58013.2022.10037148>
11. Gutnyk M., Nürnberger F. The Fe-C diagram – History of its evolution. History of science and technology, 2023, Vol. 13, Iss. 2 p.243 –262 DOI: 10.32703/2415-7422-2023-13-2-243-262

Assessment and grading

Criteria for assessment of student performance, and the final score structure

100% Final assessment as a result of Credit (35%) and Continuous assessment (65%).
35% Credit: online quiz.
65% Continuous assessment:
• 40% practical assessment (small-talks, reporting on individual research work);
• 25% written individual assignment and its oral presentation

Grading scale

Total points	National	ECTS
90-100	Excellent	A
82-89	Good	B
75-81	Good	C
64-74	Satisfactory	D
60-63	Satisfactory	E
35-59	Unsatisfactory (requires additional learning)	FX
1-34	Unsatisfactory (requires repetition of the course)	F

Norms of academic integrity and course policy

Students at NTU "KhPI" are required to uphold the Code of Ethics for Academic Relations and Integrity, which emphasizes the importance of demonstrating discipline, good manners, kindness, honesty, and responsibility. In the event of conflict situations, it is expected that students openly discuss the issues within their academic groups, seeking resolution with the guidance of their lecturer. Should a conflict remain unresolved, it is necessary to escalate the matter to the attention of the Institute's management for further assistance.

Regulatory and legal documents related to the implementation of the principles of academic integrity at NTU "KhPI" are available on the website: <http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/>

Approval

Approved by



Date, signature

Head of the department
Olena TVERYTNYKOVA

Guarantor of the educational
program