



Syllabus Course Program

HISTORY OF SCIENCE AND TECHNOLOGY

Specialty

161 Chemical technologies and engineering

Educational program

Technology of oil, gas and solid fuel refining processes

Level of education

Bachelor's level

Semester

5

Institute

Social and Humanitarian Technologies

Department

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

Course type

General, Obligatory

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>

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 - 4 hours, Workshops - 2 hours, self-study - 84 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, Vseosvita.

Program of the course

Topics of the lectures

The development of the history of science and technology from ancient times to modern times

1. Periodization of the history of science and technology
2. The Age of the Middle Ages and Modern Times

Scientific period in the development of the history of science and technology

1. Discovery in the field of chemistry
2. The current state of the history of science and technology

Topics of the workshops

Science and technology as a historical and cultural phenomenon.

1. The essence of scientific and engineering activity.
2. Achievements of ancient civilizations and the development of science in Antiquity.

Scientific and industrial revolutions

1. Main achievements in the field of science. Outstanding scientists.
2. The impact of technical developments on evolutionary processes

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.
32. The "golden period" of chemistry.
33. Origin and further development of the modern chemical industry in Ukraine.
34. The role of chemical science in the development of modern society.
35. History of electrochemistry.

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 ІІІ 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>

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



30-08-2023

Date, signature

Head of the department
Olena TVERYTNYKOVA

Guarantor of the educational
program
Iryna SINKEVYCH



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