GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	History of physics and technology, PG_00038581		
Field of study	Nanotechnology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	1.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Solid State Physics -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jarosław Rybicki	
	Teachers	prof. dr hab. inż. Jarosław Rybicki	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	0.0	0.0	15

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	15	1.0	9.0	25

Subject objectives

The purpose of the course is to familiarize students with the basics of history of physics from ancient times to the early 20th century and show the relations of progress in the field of physics and the development of technology.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W71] has general knowledge in humanistic, social, economic or legal sciences	The purpose of the course is to show the civilization significance of physics and its applications in technology.	[SW1] Assessment of factual knowledge
[K6_U71] is able to apply knowledge from humanistic, social, economic or legal sciences in order to solve problems in a social environment	Understanding the interrelationships between different areas of science.	[SU3] Assessment of ability to use knowledge gained from the subject
[K6_K71] is conscious of the need to apply knowledge from humanistic, social, economic or legal sciences in order to function in a social environment	Awareness that physical and technical sciences represent only a portion of civilization benefits and that interdisciplinary activities are required.	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents

Prehistory – physical intuition, astronomy and technology from the paleolithic Age to the beginnings of the Iron Age. Mathematics, astronomy and technology in Mesopotamia and Ancient Egypt. Science and technology in Ancient Greece (the Ionian School, Pythagoras, atomism, Aristotle, Eudoxus, Euclid, Ptolemy, Ctesibius, Hero of Alexandria). The achievements of Roman engineers. Natural sciences in the Middle Ages (Boetius, Cassiodorus, (Martianus) Capella, Isidore of Seville, Rabanus Maurus,(Venerable) Bede, etc., Bacon, the Mertonians, Witelo); statics (the architecture of cathedrals); technological progress (watermills and water saw mills, windmills, spinning wheels, windlasses. fulling mills, etc.). First universities. From Copernicus to Newton: Polish astronomy before Copernicus, Copernican Revolution, Tycho Brahe, Kepler, Galileo, Descartes, Stevin, Hooke, Newton. The beginnings of thermodynamics, the discovery of atmospheric pressure and vacuum, the description of gas processes, the beginnings of thermometry. Optics from Kepler to Newton: refraction, diffraction, interference, Newton's optics. Eighteenth-century physics: the beginnings and development of analytical mechanics (d'Alembert, Herman, Lagrange, Laplace), the development of thermodynamics, the phlogiston theory and caloric theory, Rumford's and Davy's experiments, electricity and magnetism from Gilbert to Volta. Nineteenth-century physics: electricity and magnetism from Volta to Maxwell, the optics of Young and Fresnel, from the caloric theory through kinetic theory to statistical mechanics (Boltzman, Gibbs). The crisis in physics around 1900. The discovery of radioactivity, of the electron and nucleus; the beginnings of atomic physics, nuclear physics, and particle physics; superconductivity; the discovery of X-rays and the beginnings of crystallography; first atomic models; matter waves; the old quantum theory; the beginnings of quantum mechanics. Semiconductor devices, New materials. Nanotechnology.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Knowledge of general history and physics at the high school level.</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>written test</td><td>51.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">A. K. Wróblewski, Historia fizyki

B. Orłowski, Powszechna historia techniki</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">Harry Varvoglis, History and Evolution of Concepts in Physics, Springer 2014</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:</td></tr>
</table>

Example issues/ example questions/ tasks being completed	The 10-minute test consists in selecting the correct answer. A sample set of questions: 1) The first items of iron were made by man: a) in the Paleolithic period, of meteoric iron b) in the 3rd millennium BC, primitive smelting of iron c) in the 4th-3rd millennium BC, of meteoric iron d) approx. 250 BC. 2) First copper melts were made in: a) America b) Western Europe c) Eastern Europe and the Middle East d) the far East. 3) The first pulley was used in: a) America b) Western Europe c) Eastern Europe and the Middle East d) the far East. 4) Central heating of residential houses was introduced approx.: a) 100 BC b) 50 BC c) 50 AD d) 100 AD

5) Water mills started to be built approx.:

a) 250 BC

b) 100 BC

c) in the early AD years

d) 100 AD

6) The concept of the existence of the central fire in the center of the universe originates from:

a) Thales

b) Archimedes

c) Ptolemy

d) the Pythagoreans.

7) The author of the theory of the four elements linked by relations was:

a) Aristarchus

b) Empedocles

c) Plato

d) Heron

8) Aristotle divided local motion into:

a) radial and transversal

b) transverse and longitudinal

c) natural and forced

d) ordinary and supernatural

9) The circumference was determined for the first time by:

a) Thales and Anaximander

b) Archimedes and Euclid

c) Poseidonius and Eratosthenes

d) Kepler and Brahe

10) The concept of time and absolute space was introduced by:

a) Aristotle

b) Descartes

c) Newton

d) Einstein

11) The movement of the Earth relative to the fixed stars was proven experimentally in:

a) the 11th century

b) the 17th century

c) the late 19th century

d) the early 20th century

12) The authors of the first Polish textbooks of physics are:

a) Wysocki, Brudzewski,

b) Sędziwój, Wiśniewski,

c) Wiśniewski, Chróścikowski,

d) Łukasiewicz, Olszewski

13) The supporters of the hypothesis of the existence of only one electrical fluid were:

a) Symmer and Franklin

b) Franklin and Cavendish

c) Davy and Faraday

d) David and Jacob Bernoulli

14) The Medici Stars were discovered by:

a) Medici

b) Apollonius

c) Galileo

d) Boetius

15) Isaac Newton:

a) was also involved with astrology and magic

b) was also involved with theology and alchemy

c) was also involved with theology but was an opponent of alchemy

d) was also involved with plant physiology.

16) The mass of the Earth's atmosphere was for the first time estimated by

a) Newton

b) Pascal

c) Torricelli

d) Boyle

17) The author of the first analytical textbook of mechanics is:

a) Euclid

	b) Euler c) Bernoulli d) Newton 18) The mass of the Earth was for the first time determined by: a) Witelo b) Cavendish c) Hershel d) Einstein 19) Who was involved with groundwater studies of electromagnetic waves? a) Coulomb and Ohm b) Faraday and Franklin c) Hertz and Edison d) Hertz and Helmholtz 20) Phlogiston was a factor responsible for: a) thermal conductivity b) combustion processes c) electrical conductivity d) propagation of acoustic waves
Work placement	Not applicable

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