UNIVERSITÀ DEGLI STUDI DI BARI ALDO MORO

DIPARTIMENTO INTERUNIVERSITARIO DI FISICA

General information	
Academic subject	History of Physics
Degree course	Physics, Mathematics, Information Science, Philosophy specializes in Philosophy of Science
Academic Year	Third
European Credit Transfer and Accumulation System (ECTS)	Four
Language	Italian
Academic calendar (starting and ending date)	Second semester
Attendance	No

Professor/ Lecturer	
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Department and address	Interuniversity Department of Physics
Virtual headquarters (Microsoft Teams code)	
Tutoring (time and day)	Monday 15.30-17.30 in the teacher'office

Syllabus	
Learning Objectives	Provide knowledge of scientific thought from its origin to the early 1900's
Course prerequisites	Basic knowledge of classical physics.
Contents	Introduction to the course and its motivations. History of greek science: Thales, Hecataeus, Anaximander, Anaximenes, Heraclitus, Pthagoras and his school, Parmenides, Empedocles, Democritus, Plato, Aristotle, Strato, Archimedes, Euclid. Developments of Greek Astronomy: Eudoxus, Heraclides Ponticus, Library of Alexandria and Pergaum. Aristarcus, Eratosthenes, Apollonius, Hipparchus, Ptolemy. Scientific developments in Arab culture. Developments of optics in antiquity. Scientific in the early idle Age. Optics: Galen, Al Kindi, Alhazen, Avicenna, Vitellione, Leonardo. Science in the late idle Ages: Roger Bacon, Pierre de Maricourt, Buridan, Occam, Cusanus. Science and technology in the Renaissance: Stevino, F. Bacon, Copernicus, Tycho Brahe, Kepler, della Porta. Galileo: life, the telescope, astronomical discoveries, birth of the experimental method, motion of bodies due to the gravity, study of the motion in inclinates plane, the pendulum laws, studies about Divine Coedy, contribution to the philosophy of science and scientific method, trials by inquisition. Contributions of Pierre de Maricourt, Descartes and Roger Bacon to Physics and the scientific method. Birth of European scientific societies. Magalotti, Torricelli, Fermat. Contributions of father Grimaldi and Hughens to the development of optics. Boyle and Hooke. Isaac Newton's contributions to physics and to the philosophy of science: life, colour theory , differential calculus, foundations of mechanics theor of universal gravitation. Cavendish and the experimental verify of Newton's law of gravity. Roemer and the measurement of the light speed. Bradley and the measure of stellar parallax. Developments of mechanics in the eighteenth century: Euler and analytical mechanics. Variational principles: Fermat, Maupertuis and the principle of minimal action, Lagrange and analytical mechanics, Hamilton. Developments of electricity between the eighteenth and early nineteenth centuries: contributions by Gray, du Fay, van Musschenbroeck, Franklin, Aepinus, Priestley, Coulomb, Galvani and Volta. The birth of Thermodynamics. Temperature measurements. Relationship between heat and temperature: Black, Gassendi Stahl, Lavoisier and the theory of phlogiston and caloric. The development of thermal engines in the eighteenth century: Mayer, Carnot, Clausius, lord Kelvin. Developments of optics in the nineteenth century: Young and the interference, Fresnel. The luminiferous ether: Arago, Fresnel, the experiment of Fizeau, Airy, Boscovich, the Michelson and Morley experiment. Developments of spectroscopy: Herschel, Ritter, Fraunhofer Brewster, Kirchhoff and Bunsen and the emission and absorption spectra.

	Electricity and magnetism in the 19th century: Oersted, Ampere, Weber, Faraday, Maxwell, Lorentz. Discovery of X-rays, radioactivity and blackbody emission. Planck and the law of the black body. Einstein contributions: photoelectric effect, transition probabilities (1917), special and general relativity. Atomic spectra,
Books and bibliography	Course slides.
Additional materials	

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
100	32		68
ECTS			
Four			

Teaching strategy	
Frontal lessons	Power point

Expected learning outcomes	
Knowledge and understanding on:	Students must learn about the development of physical science over the centuries and the scientific debate that underlies it.
Applying knowledge and understanding on:	Students must learn about the development of physical science over the centuries and the scientific debate that underlies it.
Soft skills	• **Making informed judgments and choices** The student will have to achieve an independent judgment on the development of Physics. • **Communicating knowledge and understanding** The student should be able to communicate the basic ideas behind an major change in physical knowledge. • **Capacities to continue learning** The student must be able to independently learn the developments of scientific thought.

Assessment and feedback	
Methods of assessment	Discussion of a term paper on a topic chosen by the student and questions on the program developed during the lessons.
Evaluation criteria	• **Knowledge and understanding** The oral test will allow to evaluate the knowledge acquired by the candidate. • **Applying knowledge and understanding** The oral test will also allow the evaluation of an autonomy of judgement relating to the evolution of physical knowledge and the preconceived ideas that have followed one another over the centuries. • **Autonomy of judgment** In the oral exam, the candidate's ability to make independent judgments will be highlighted • **Communicating knowledge and understanding** In the oral test, the candidate's communication skills and, in particular, the clarity and precision of the language will be assessed • **Communication skills** In the oral exam, the candidate's learning ability will be assessed. • **Capacities to continue learning** In the oral exam, the candidate's learning ability will be assessed.
Criteria for assessment and attribution of the final mark	The student will have to highlight the knowledge acquired through a freely chosen essay and questions on the program. It will also be evaluated on the basis of the clarity of the topics covered by the presentation.
Additional information	