Name of the module/subject Code PhySics Product of study (general academic, practical) general academic, practical) general academic Year /Semester Elective path/specially Subject offered in: Polish Course (computery, elective) Cycle of study: First-Cycle studies From of study (tul-line.part-time) full-time No. of nous Elective path/specially No. of croats Lecture: 45 Classes: 15 Laboratory: 0 Project/seminars: 0 4 Status of the course in the study program (Base, major, other) University-wide, from another field) 0 4 100% Education areas and fields of science and art ECTS destribution (number and study) 4 100% Responsible for subject / lecturer: Indemental knowledge, skills and social competencies: 1 Knowledge Indemental knowledge of physics and mathematics (program basis for high schools, standard level) 1 2 Skills Skills in solving elementary problems in physics based on the knowledge possessed, ability to estract information from the recommended sources 1 1 3 Social understanding of the neage defined by the program relevant for the field of study.			STUDY MODULE D	ESCRIPTION FORM				
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5. U05 student can use, with understanding, the recommended sources of knowledge (basic references list), as well as gain knowledge from other sources K_U01 Social competencies:	 4. U04-student can formulate simple conclusions on the basis of solving problems K_U16 							
Social competencies:	5. U05- knowle	5. U05 student can use, with understanding, the recommended sources of knowledge (basic references list), as well as gain knowledge from other sources K_U01						
	Socia	l competencies:						

1. K01-student can get actively involved in solving problems stated, develop and extend his (her) competences unaided K_K01, K_K03

2. K02-student can cooperate within a team, fulfill the duties resulting from division of team work, show responsibility for his (her) own work and joint responsibility for the results of team work K_K01

3. K03-comply with fundamental ethical principles K_K05

Assessment methods of study outcomes				
W01,W02: written/oral exam				
3.0: 50.1%-60.0%				
3.5: 60.1%-70.0%				
4.0: 70.1%-80.0%				
4.5: 80.1%-90.0%				
5.0: from 90.1%				
U01, U02: written test				
U03, U04, U05: solving problems in physics at auditory classes, written/oral exam, written test				
3.0: 50.1%-60.0%				
3.5: 60.1%-70.0%				
4.0: 70.1%-80.0%				
4.5: 80.1%-90.0%				
5.0: from 90.1%				
K01, K02, K03: activity at auditory classes, written test				
3.0: 50.1%-60.0%				
3.5: 60.1%-70.0%				
4.0: 70.1%-80.0%				
4.5: 80.1%-90.0%				
5.0: from 90.1%				
Course description				

I. Mechanics.	1.	Mechanics:
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- kinematic and dynamic of translation (Newton's Laws, conservation of mechanical energy, conservation of linear momentum),
- kinematic and dynamic of rotation (Newton's second Law for rotation, conservation of angular momentum),
- oscillations: mechanical oscillations (simple harmonic motion (SHM), kinematics and energy of SHM, forced oscillations, damping, resonance),
- mechanical waves: transverse and longitudinal waves, the speed of a traveling wave, energy and power of a traveling wave, the principle of superposition for waves, interference of waves, standing waves, sound waves, ultrasounds, infrasounds, Doppler effect.
- 2. Gravitation:
- gravitational field and force, orbits and energy of satellites, effect of gravity on space-time, curvature of space.
- 3. Thermodynamics:
- The Zeroth, First and Second Law of Thermodynamics,
- the kinetic theory of gases,
- heat transfer mechanisms.
- 4. Electromagnetism:
- electric field (the electric field due to a point charge and an electric dipole, Coulomb's Law, the Gauss' Law: cylindrical, plannar and spherical symmetry, electric potential, capacitance),
- magnetic field (magnetic field due to a current, electrodynamic force, Biot–Savart Law, Ampere's Law, Gauss' Law for magnetic, Faraday's Law of induction, Lenz's Law),
- charge particle in electric and magnetic field; cyclotrons and synchrotrons,
- conductivity/ the electrical properties of solids, energy levels in solids (metals, insulators, semiconductors, *n*-type and *p*-type semiconductors, the *p*-*n* junction), superconductors,
- magnetic materials (diamagnetism, paramagnetism, ferromagnetism).
- electromagnetic waves: Maxwell's equations, the electromagnetic spectrum.
- 5. Optics:
- reflection and refraction of light, total internal reflection of light, critical angle, white light, dispersion, diffraction, interference and polarization of light, diffraction gratings, Brewster's Law,
- travelling of electromagnetic waves in the medium (VIS and IR range) classical and photonic optical fibres,
- lasers work and applications.
- 6. Special theory of relativity (relativity, the speed of light postulate, mass and energy, time dilatation, length contraction, the twin paradox, Doppler effect of light).
- 7. Selected problems of modern physics:
 - the hydrogen atom
 - quantum nature of light (photons, the photoelectric effect),
 - matter waves (de Broglie waves),
 - Schrödinger's equation, Heisenberg's uncertainty principle,
 - barrier tunneling effect STM the scanning tunneling microscope,
 - low-dimensional structures (nanocrystallites, quantum dots, quantum corrals, graphene).

Basic bibliography:

1. D.Halliday, R.Resnick, J.Walker, *Podstawy fizyki*, t. 1-5, PWN, Warszawa 2003.

2. D.Halliday, R.Resnick, J.Walker, Podstawy Fizyki, Zbiór zadań, PWN, Warszawa 2005.

 K.Jezierski, B.Kołodka, K.Sierański, Fizyka. Zadania z rozwiązaniami, t. 1-2, Oficyna Wydawnicza Scripta, Wrocław 2009.

Additional bibliography:

- 1. J. Masalski, Fizyka dla inżynierow, t.1-2, WNT, Warszawa 1980.
- 2. J. Orear, Fizyka, t. 1-2, WNT, Warszawa1998.

Result of average student's workload

Activity

1. participation in lectures	45					
2. participation in auditory classes	15					
3. preparation for auditory classes	15					
4preparation for written test	15					
5. participation in consultation concerning education process	2					
6. preparation for exam	45					
7. participation in exam	2					
Student's workload						
Source of workload hours	ECTS					
Total workload 139	4					
Contact hours 64						
Practical activities 45						