

FACULTY ELECTRONICS					
SUBJECT CARD					
Name of subject in Polish:	Fizyka				
Name of subject in English:	Physics				
Main field of study (if applicable):	Electronic and Computer Engineering				
Specialization (if applicable):				
Profile:	academic				
Level and form of studies:	1 st level/ full-time				
Kind of subject:	obligatory				
Subject code:	FZP001127				
Group of courses:	YES				
	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	90		90		
Form of crediting	Examination		crediting with grade		
For group of courses mark (X) final course	x				
Number of ECTS points	6				
including number of ECTS points for practical (P) classes			3		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	1		1		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Recommended knowledge of physics on the extended level of Polish Matura

SUBJECT OBJECTIVES

C1. Acquire basic knowledge of classical mechanics, phenomenological thermodynamics, concepts of statistical thermodynamics, quantum physics and condensed matter physics.

C2. Master the skill of conducting a simple experiment, estimating the uncertainty of measurement results and preparing a report on experiment.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEU_W01 – knows and can explain basic laws of point mass dynamics, point mass systems and a rigid body; knows properties of an oscillator and wave phenomena. .

PEU_W02 – knows and can explain basic laws phenomenological thermodynamics and understands basic concepts of statistical thermodynamics (classical and quantum statistics)

PEU_W03 – knows basic concepts of quantum mechanics and quantum optics; knows properties of real quantum systems (atom, molecule, crystal, nanostructures)

relating to skills:

PEU_U01 – can use simple measuring devices (for measuring length, time and other physical quantities)

PEU_U02 – can perform the measurement of basic physical quantities with the use of the measuring system instruction

PEU_U03 – can work out the measurement results and do the uncertainty analysis with the use of engineering tools

relating to social competences:

PEU_K01 can collaborate in a small group

PROGRAMME CONTENT

Lecture		Number of hours
Lec 1	Introduction: the subject of interest and methodology of physics; scientific method; physical quantities and units	2
Lec 2	Kinematics – mathematical description of motion	2
Lec 3	Point mass dynamics; equations of motion for simple cases	2
Lec 4	Work and mechanical energy; mechanical energy conservation principle	2
Lec 5	Dynamics of point mass systems; momentum conservation principle	2
Lec 6	Dynamics of circular motion; rigid body; angular momentum conservation principle	2
Lec 7	Oscillatory motion; harmonic oscillator; damped and forced oscillations; resonance	2
Lec 8	Elements of wave physics; definition of a wave; energy and momentum transport; interference phenomena; standing waves; electromagnetic spectrum	2
Lec 9	Black body radiation; quantum statistics. External photoelectric effect; wave-particle duality of light	2
Lec 10	Line spectra - the puzzle of the atom structure. De Broglie hypothesis; Davisson-Germer experiment; electron diffraction on a double slit.	2
Lec 11	Basics of quantum mechanics: Born probabilistic interpretation; Schrödinger equation; measurement in quantum mechanics; Heisenberg uncertainty principle; quantum entanglement	2
Lec 12-13	Simple model quantum systems: 1D potential well, well systems; reference to real systems (atom, systems of atoms). Ground and excited states. Laser.	4

Lec14-15	Properties of metals and dielectrics in quantum picture (electronic band structure). Semiconductors – basic properties. Elements of p-n junction physics; semiconductor devices: diode, transistor, light emitting diode, semiconductor laser, EM radiation detector.	4
	Total hours	30

Laboratory		Number of hours
Lab 1	Introduction to laboratory classes: organizational issues and rules of work in the lab; getting familiar with: a) health and safety rules, b) rules of preparing written reports on exercises, c) getting familiar with basics of measurement uncertainty analysis. Examples of simple measurements.	2
Lab 2	Determination of the moment of inertia for chosen rigid bodies with the use of the physical pendulum method; checking the Steiner theorem	2
Lab 3	Determination of thermal expansion coefficient with the use of electrical method	2
Lab 4	Measurement of thermal conductivity of insulators	2
Lab 5	Measurements of resistivity dependence on temperature in metals and semiconductors	2
Lab 6	Investigation into the Ohm law for alternated current (AC)	2
Lab 7	Investigation into electromagnetic resonance	2
Lab 8	Measurement of the focal lengths of thin lenses	2
Lab 9	Determination of the wavelength with the use of diffraction grating	2
Lab 10	Determination of the lens curvature radius and the wavelength with the use of Newton rings	2
Lab 11	Determination of the Planc constant basing on the characteristics of electroluminescent diodes	2
Lab 12	Investigation into the Hall effect	2
Lab 13	Supplementary classes and crediting	6
Total		30

TEACHING TOOLS USED

N1.Traditional lecture.
N2.Consultations
N3. Self-study
N4. Laboratory exercises

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end))	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 – PEU_W03	Written or oral exam
F2	PEU_U01 – PEU_U03 PEU_K01	Tests and/or oral answers, reports
C= (0.51*F1+0.49*F2); F1 i F2 must be positive		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] H. D. Young, R. A. Freedman, *University Physics*, Pearson–Addison Wesley, 2014
- [2] Hyperphysics: <http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html>
- [3] Source books in English available in the library
- [4] Ćwiczenia Laboratoryjne z Fizyki, Tomy 1-4, Oficyna Wydawnicza Politechniki Wrocławskiej (available on the web page <http://www.if.pwr.wroc.pl/lpf>)
- [5] Descriptions of experiments and working instructions available on the web page <http://www.if.pwr.wroc.pl/>

SECONDARY LITERATURE:

- [6] D. Halliday, R. Resnick, J. Walker, *Podstawy fizyki*, tom 1,2,4,5, Wydawnictwo Naukowe PWN, Warszawa 2003
- [7] Jay Orear, *Fizyka*, Wydawnictwo Naukowo-Techniczne, Warszawa, 2008.
- [8] I.W. Sawieliew, *Wykłady z fizyki*, tom 1-3, Wydawnictwo Naukowe PWN, Warszawa, 2003.
- [9] List of problems published by the lecturer,
- [10] W. Korczak, M. Trajdos, *Wektory, pochodne, całki*, Wydawnictwo Naukowe PWN, Warszawa, 2013.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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