PHYSICS

Course code	*FUN131*
Course title	*Physics*
Type of course	*Main*
Year of study	*First*
Semester	*Spring*
ECTS	*6*; *24 hours of theory, 24 hours of practice, 114 hours of self-study*
Coordinating lecturer	*Prof. dr. Jonas Gradauskas*
Studies form	*Full-time*
Prerequisites	*None*
Language of instruction	*English*

Annotation

This course covers full range of introductory topics in Physics giving theoretical and practical background in the field. Students completing introductory Physics courses are expected to show a mastery of basic material, both in terms of concepts and problem-solving skills, especially in mechanics, thermodynamics, electricity and magnetism, optics, all needed for continuing success in life science disciplines or engineering.

Aim of the course

To provide students with knowledge about classical and modern physics and form their practical abilities to apply fundamental nature laws.

Learning outcomes

The student will demonstrate the ability to think critically and to use appropriate concepts of physics in analysis of qualitative problems or everyday situations.

Course learning outcomes (CLO)	Study methods	Assessment of learning outcomes
CLO1. Have a working knowledge of classical mechanics and its application to "standard" problems such as linear and rotational kinematics and dynamics	Lectures, practice, problem solving	Control works, final examination, retake
CLO2. Have a working knowledge of basics of oscillations, waves and sound	Lectures, practice, problem solving	Control works, final examination, retake
CLO3. Have a working knowledge of basic thermodynamic principles and relation with molecular kinetic theory	Lectures, practice, problem solving	Control works, final examination, retake
CLO4. Have a working knowledge of basic electrostatics, electrodynamics, magnetism, and electromagnetic induction	Lectures, practice, problem solving	Control works, final examination, retake
CLO5. Have a working knowledge of atomic material structure of matter, light properties, and radiation interaction with matter	Lectures, practice, problem solving	Control works, final examination, retake

Quality assurance issues

Current structure of the course reflects regular student feedback that is highly appreciated and collected both formally (after completing the course) and informally (during the course). The variety of learning methods used in the course assumes regular check-ups including questions/answers during workshops and control works.

Cheating prevention

Teaching and testing methods of the course favor learning and creativity as opposed to cheating. The university regulations on academic ethics are fully applied in the course.

Topics

No.	Topic	Classroom hours		Readings
		Lectures	Workshop	
1.	The nature of physics. Measurements. Dimentional analysis. Standarts and units Coordinate system.	2	2	Ch. 1
2.	Linear motion. Displacement, velocity, acceleration; relation between them. Circular motion.	2	2	Ch. 4
3.	Linear dynamics. Force, mass, inertia. Newton's laws. Momentum. The law of conservation of momentum.	2	2	Ch. 3-4
4.	Work. Kinetic and potential energy. The law of energy conservation. Power.	2	2	Ch. 4-5
5.	Circular dynamics. Torque, rotational inertia. Kinetic energy of rotating and rolling body. Angular momentum. The law of conservation of angular momentum.	2	1	Ch. 3, Ch. 5
	Control work 1.	0	1	
6.	Oscillations: free, damped. Resonance. Waves. Sound. Doppler effect.	2	2	Ch. 12
7.	Temperature. Heat. The ways of heat transfer. The ideal gas law.	2	2	Ch. 8
8.	The first and the second laws of Thermodynamics. Heat engines. Refrigerator.	2	2	Ch. 8-9
9.	Electric charge. Electric current, DC and AC. Electric conductors.	2	1	Ch. 10
	Control work 2.	0	1	
10.	Magnetism. Electromagnetic induction.	2	2	Ch. 11
11.	Electromagnetic waves. Spectrum. Light.	2	2	Ch. 13-14
12.	Semiconductors. Types of semiconductors, junctions. Solar cell, its efficiency.	2	1	Ch. 2
	Control work 3.	0	1	
	Total hours:	**24**	**24**	

Individual work and assessment

Type	Topics	Self-study hours	Weight, %
Control work #1	1–5	20	10
Control work #2	6-8	10	10
Control work #3	9-12	20	10
Exam	1–12	64	70
Total:		**114**	**100**

Assessment

1. All assignments are graded in a 10-point scale. Negative marks do not count.
2. Each control work involves solution of problems on the corresponding topics covered so far. Control work will take one academic hour. During this time personal notebooks can be used as well as formula list in a hand-written form.
3. Final exam is the closed book written exam. It covers all topics from 1 to 12. Exam will be held in session, duration – 2 academic hours. Students are not allowed to use any additional printed of written materials but a formula list in a hand-written form. One day before the exam a two academic hour-long consultation will be arranged.
4. The final mark is calculated by the following formula (negative marks will be replaced by 0):

$$\text{Final grade} = 0.1 \times (CW1+CW2+CW3) + 0.7 \times E,$$

where CW1, CW2 and CW3 are marks for the respective control work assessment, E – mark for the exam.

5. In case of negative final mark (4 or less) students can be allowed to retake an exam once. The retake does not cover the control work assignments; hence the weight of the retake is 70%. Control work assessments are not annulled.

Main textbook

P. G. Hewitt. *Conceptual Physics.* Pearson International Edition, 11th Edition, Pearson, 2009, 737 p.

Supplementary textbook

1. J. D. Cutnell, K. W. Johnson, D. Young, S. Stadler. *Introduction to Physics*. 10th Edition International Student Version, Wiley, 2015, 896 p.
2. H. D. Young, R. A. Freedman. *University Physics Plus Modern Physics*. 13th Edition, Pearson, 2011, 1632 p.