Faculty of Mechanical Engineering / MECHATRONICS / PHYSICS

Course:	PHYSICS			
Course ID	**Course status**	**Semester**	**ECTS credits**	**Lessons** (Lessons+Exercises+Laboratory)
265	Mandatory	2	4	2+2+0
Programs	MECHATRONICS			
Prerequisites	Non.			
Aims	The course of Physics, as a fundamental natural science, prepares students for studying natural phenomena in physics, allows them to adopt the language and methods used in the study of physical phenomena and introduces students to the major concepts and theories which frame our knowledge about material world.			
Learning outcomes	1. explain essence of processes in the main areas of general Physics; 2. apply mathematical formalism necessary for qualitative and quantitative analysis in these areas; 3. use basic experimental methods and statistically and graphically analyze the obtained measurement results; 4. use scientific and technical literature.			
Lecturer / Teaching assistant	professor dr Ivana Pićurić and Dušan Subotić			
Methodology	Lectures, studying, consultations.			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	A detailed presentation of the organization of lectures and exames. Introduction to the Physical Mechanics; Kinematics. Position. Velocity. Acceleration. Motion with constant velocity. Motion with constant acceleration. Projectile motion. Uniform circular motion.			
I week exercises	Tasks from the material from last weeks and/or this weeks lectures.			
II week lectures	Dynamics. Newtons first law. Inertial reference frames and relative motion. Mass. Newtons second law. Newtons third law. Work done by a constant force. Work as a dot product. Work done by a variable force. Power. Work energy teorem. Kinetic energy. Potential energy. Conservative forces. Conservation of mechanical energy. Friction.			
II week exercises	Tasks from the material from last weeks and/or this weeks lectures.			
III week lectures	Oscilating systems. The simple harmonic oscillator. Energy in simple harmonic motion. The simple pendulum. Damped harmonic motion. Forced osccillations and resonance.			
III week exercises	Tasks from the material from last weeks and/or this weeks lectures.			
IV week lectures	Mechanical waves. Types of waves. The wave equation. Traveling waves. Wave speed on a stretched string. Standing waves. Energy in wave motion. Resonance in the stretched string.			
IV week exercises	Tasks from the material from last weeks and/or this weeks lectures.			
V week lectures	Sound waves. Traveling sound waves. The speed of sound. Power and intensity of sound waves. Vibrating air columns. The Doppler effect.			
V week exercises	Tasks from the material from last weeks and/or this weeks lectures.			
VI week lectures	Electrostatics. Electric charge. Coulombs law. The electric field. The electric field of point charge and a ring of charge. Electric field lines.			
VI week exercises	Tasks from the material from last weeks and/or this weeks lectures.			
VII week lectures	Electric potential energy and potential. Calculating the potential from the field. Potential due to point charge. Equipotential surfaces. Capacitance. Capacitors. The flux of the electric field. Gauss law. A parallel plate capacitor. Capacitors connected in parallel and connected in series. Energy storage in an electric field.			
VII week exercises	Tasks from the material from last weeks and/or this weeks lectures.			
VIII week lectures	Test.			
VIII week exercises				
IX week lectures	The magnetic field. Two parallel currents. The definition of B. Magnetic field lines. Magnetic flux. Ampers law. Calculating the magnetic field due to a current, law of Biot nd Savart. Magnetic field due to a current in a long straight wire and in a circular arc of wire. Magnetic force on a current carrying wire. Magnetic field of a solenoid.			

IX week exercises	Tasks from the material from last weeks and/or this weeks lectures.
X week lectures	Faradays law of induction. Lenzs law. Induction and energy transfers. Inductor and inductance. Self induction. Energy stored in magnetic field.
X week exercises	Tasks from the material from last weeks and/or this weeks lectures.
XI week lectures	Reflection and refraction of light waves. Total internal reflection. Chromatic dispersion. Plane mirrors. Spherical mirrors. Spherical refracting surfaces. Thin lenses. Two lens systems. Simple magnifaying lens. Microscope.
XI week exercises	Tasks from the material from last weeks and/or this weeks lectures.
XII week lectures	Interference. Diffraction and polarization.
XII week exercises	Tasks from the material from last weeks and/or this weeks lectures.
XIII week lectures	Nuclear physics. Some nuclear properties.
XIII week exercises	Tasks from the material from last weeks and/or this weeks lectures.
XIV week lectures	Radioactive decay. Alpha decay. Beta decay. Measuring ionizing radiation.
XIV week exercises	Tasks from the material from last weeks and/or this weeks lectures.
XV week lectures	Test correction.
XV week exercises	
Student workload	

Per week	**Per semester**
4 credits x 40/30=5 hours and 20 minuts 2 sat(a) theoretical classes 0 sat(a) practical classes 2 excercises **1 hour(s) i 20 minuts** of independent work, including consultations	Classes and final exam: **5 hour(s) i 20 minuts x 16 =85 hour(s) i 20 minuts** Necessary preparation before the beginning of the semester (administration, registration, certification): **5 hour(s) i 20 minuts x 2 =10 hour(s) i 40 minuts** Total workload for the subject: **4 x 30=120 hour(s)** Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) **24 hour(s) i 0 minuts** Workload structure: **85 hour(s) i 20 minuts (cources), 10 hour(s) i 40 minuts (preparation), 24 hour(s) i 0 minuts (additional work)**
Student obligations	
Consultations	
Literature	Halliday, Resnick and Walker: Fundamentals of Physics, volume 1 and 2 (7th edition);
Examination methods	Test 50 points; Final exam 50 points.
Special remarks	
Comment	

Grade:	F	E	D	C	B	A
Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points