Course code	Course group	Volume in ECTS credits	Course hours
FIZ1008	C	6	160

Course type (compulsory or optional)	**Compulsory**
Course level (study cycle)	**Bachelor**
Semester the course is delivered	**Autumn**
Study form (face-to-face or distant)	**Face-to-face**

Course title in Lithuanian

FIZIKA II (ELEKTROMAGNETIZMAS IR OPTIKA)

Course title in English

PHYSICS II (ELECTROMAGNETISM AND OPTICS)

Short course annotation in Lithuanian

Dalyką sudaro dvi pagrindinės dalys. Pirmojoje dalyjej supažindinama su elektromagnetizmo pagrindais: elektrostatika, magnetostatika, elektromagnetine indukcija, Maksvelio lygtimis, elektromagnetinėmis bangomis. Antroji kurso dalis skirta fizikinei ir geometriniai optikai: optinėms bangoms, terpių optinės savybėms, šviesos interferencijai ir difrakcijai, geometrinės optikos dėsniams, optiniams prietaisams.

Short course annotation in English

This course is divided into two components. The first component is basic electromagnetism: the laws of electrostatics, magnetism and electromagnetic induction, Maxwell's equations, electromagnetic waves. The second component of the course gives a general coverage of physical and geometrical optics: introduction to light as an electromagnetic wave, the properties of optical media, light interfaces and diffraction, geometric optics lows, optical instruments.

Prerequisites for entering the course

Calculus I, Calculus II, Physics I

Course aim

The main goal is to develop an understanding of basic laws of electromagnetic and optic phenomena, to teach to apply acquired knowledge to solve simple problems of electromagnetism and optics, to form basic skills of electrical and optical measurements.

Links between course outcomes and criteria of learning achievement evaluation

Course outcomes	Criteria of learning achievement evaluation
To able to explain the interaction between charges, the properties of electric field in vacuum, the electric field interaction with dielectrics and conductors, dc circuits and ac-circuits.	Explains charge conservation law, Coulumb's law, electric field of point charge, Gauss's law, charge potential energy, plane capacitors, electric current, Ohm's law, electric power, alternating current, Kirchhoff's rules, RC circuit
To able to explain magnetic field properties, interaction with moving charge and magnetic field, electromagnetic induction phenomenon.	Explains properties of magnetic field, magnetic field of straight current, point charge moving in magnetic field, magnetic field of solenoid, magnetic moment, mass spectrometer, Faraday's low, Lenz's law, electric generators.
To able to explain optical wave propagation in vacuum and dielectrics, light interference and diffraction phenomenon, principles of operation of simple optical devices.	Explains properties of harmonic electromagnetic waves, speed of light, Huygen's principle, constructive and destructive interference, Young's dauble slit experiment, diffraction by a single slit, diffraction gratings, spectrometer, index of refraction, refraction law, thin lenses, ray tracing, magnifying glass, compound microscope, telescopes, chromatic and spherical aberrations.
To able to perform simple electrical and optical measurements, to perform measurements with	Lab reports

Science Workshop interface and DataStudijo software.	

Content (topics)

1. Electric charge.
2. The electric field.
3. Capacitors.
4. Electric field in dielectrics.
5. Electric current and dc circuits.
6. The magnetic field.
7. Charge movement in a electromagnetic field.
8. Magnetic field in matter, dia and paramagnetism.
9. Electromagnetic induction
10. Ac current
11. Electromagnetic waves and optical waves.
12. Light polarization
13. Light interference.
14. Light diffrakcion
15. Geometrical optics, optical instruments.
Practical work (contents): Laboratory works: Kirchhoff's rules, LRC circuit, Ampere's law, Light reflection and refraction laws, Monochromatic light diffraction.

Distribution of workload for students (contact and independent work hours)

Lectures – 45 hours, seminars – 15 hours, laboratory works – 15 hours, individual work – 85 hours. Total 160 h.

Structure of cumulative score and value of its constituent parts

Final assessment sums the assessments of written final examination (50%), written mid-term examination (20%) and assessment of practical works: seminars (15 %), laboratory (15%).

Recommended reference materials

No.	Publication year	Authors of publication and title	Publishing house	Number of copies in		
				University library	*Self-study rooms*	*Other libraries*
Basic materials						
1.	2004	Girdauskas V., *Elektra ir magnetizmas: paskaitų iliustracijos*	Course material in intranet			
2.	2008	Girdauskas V., O*ptika: paskaitų iliustracijos*	Course material in intranet			
3.	1989	Tamašauskas A., Vosylius J. *Fizika 2T.*	Mokslas	30		
Supplementary materials						
1.	2010	A.Bogdanovičius, Fizikos pagrindai inžinerijoje. 2 dalis	Vilnius technika		1	10

Course programme designed by

Assoc. Prof. Dr. Valdas Girdauskas, Faculty of Natural Sciences, Department of Physics