

## UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	FIZIKA II
<b>Course Title:</b>	PHYSICS II

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
UŠP Tehniška varnost, 1. stopnja	/	1.	2.
USP Technical Safety, 1 <sup>st</sup> Cycle	/	1 <sup>st</sup>	2 <sup>nd</sup>

**Vrsta predmeta / Course Type** obvezni / Mandatory

**Univerzitetna koda predmeta / University Course Code:** IN107

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45	/	30 SV	/	/	75	5

**Nosilec predmeta / Lecturer:** izr. prof. dr. Miha Ravnik / Dr. Miha Ravnik, Associate Professor

**Jeziki / Languages:**

<b>Predavanja / Lectures:</b>	Slovenski / Slovenian
<b>Vaje / Tutorial:</b>	Slovenski / Slovenian

**Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:**

Študent oz. kandidat mora imeti predmet opredeljen kot študijsko obveznost.	Prerequisites: The course has to be assigned to the student.
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### Vsebina:

**Električno in magnetno polje:** statično električno polje, jakost električnega polja, električno polje točkastega naboja, Coulombov zakon, kondenzator, kapaciteta kondenzatorja, dielektrik v električnem polju, izmenični tok skozi kondenzator izoliran prevodnik v električnem polju, influenza, specifični upor, Ohmov zakon, enosmerni in izmenični tok, merjenje električnega toka in napetosti, statično magnetno polje, gostota magnetnega polja, sila na vodnik v magnetnem polju, magnetni navor na tokovno zanko, magnetni moment, induktivnost tuljave, izmenični tok skozi tuljavo, indukcija, generator in elektromotor, transformator.

**Svetloba:** elektromagnetno nihanje in valovanje, hitrost svetlobe, odboj, lom in

### Content (Syllabus Outline):

**Electric field and electric current:** Coulomb's law, static electric field; electric field of a point charge, electric field of an electric dipole, electric potential, voltage, Gauss's law, Poisson's equation, capacitor, capacitance, dielectric in electric field, insulated conductor in electric field, influence, Ohm's law, direct and alternating current, alternating current through Ohm's resistor and capacitor, measuring electric current and voltage, electrical work and power.

**Magnetic field:** static magnetic field, density of magnetic field, magnetic force on a current-carrying conductor, magnetic torque on a current loop, magnetic moment, bio-magnetic orientation (via magnetite crystals), Amper's law, magnetic field in the vicinity of a long

interferenca svetlobe, svetlobni energijski tok, fotometrija, spekter svetlobe, elektromagnetno sevanje segrelih teles (Wiennov in Stefanov zakon)

**Geometrijska optika:** zrcala in leče enačba zrcal in leč, optične naprave: oko, povečevalno steklo in mikroskop.

**Osnove atomske fizike:** fotoefekt, unklonska slika curka elektronov, de Broglijeva valovna dolžina, zakoni sevanja črnega telesa, Bohorov model atoma, jedrski razpadi.

straight wire, in the coil, inductivity of a coil, alternating current through a coil, induction, alternating current in an undamped and damped electric circuit.

**Light:** formation of electromagnetic radiation, speed of electromagnetic radiation, reflection, refraction and interference, radiant energy, absorption of light, photometry, light spectrum, electromagnetic radiation of black bodies (Wienn's and Stefan's law).

**Geometrical optics:** reflectors and lenses, equation of mirrors and lenses, eye, vision corrections, optical devices, magnifying glass and microscope.

**Selected topics in modern physics:** photo effect, electron beam diffraction, de Broglie's wave length, Bohr's model of atom.

#### Temeljni literatura in viri / Readings:

- I. Serša, Fizika za študente tehniške varnosti, FKKT, 2009, 129 strani (90%)
- J. Strnad: Fizika II, DZS, Ljubljana, 1977. 288 str. (50%)
- J. Strnad: Fizika II, DZS, Ljubljana, 1998. 293 str. (10%), ali
- R. Kladnik: Visokošolska fizika II, DZS, Ljubljana, 1989. 335 str. (60%)

#### Cilji in kompetence:

Pri predmetu Fizika II študenti nadaljujejo s pridobivanjem razumevanja osnovnih fizikalnih pojmov in fizikalnih količin, spoznajo osnovne zakone narave, ter se ob reševanju problemov navadijo osnov analitičnega mišljenja.

#### Objectives and Competences:

During the physics course students obtain the understanding of basic physical concepts and quantities, they obtain the understanding of the basic laws of nature and through problem solving acquire the basics principles of analytical thinking.

#### Predvideni študijski rezultati:

##### Znanje in razumevanje:

Pri predmetu Fizika II študenti nadaljujejo s pridobivanjem razumevanja osnovnih fizikalnih pojmov in fizikalnih količin, spoznajo osnovne zakone narave.

##### Uporaba

Ob reševanju problemov se navadijo osnov analitičnega mišljenja.

#### Intended Learning Outcomes:

##### Knowledge and Comprehension

Students continue to obtain the understanding of the basic laws of nature and through problem solving acquire the basics principles of analytical thinking.

##### Application

The acquired knowledge of physics will enable the student to critically evaluate the different approaches to establish technical and fire safety.

<u>Refleksija</u> Pridobljeno znanje fizikalnih osnov bo študentu omogočilo kritično ovrednotiti različne posege za zagotavljanje tehnične in požarne varnosti.	<u>Analysis</u> In-depth analysis of system behaviour in nature.
<u>Prenosljive spretnosti</u> Spoznajo računske pristope, potrebne za reševanje različnih tipov fizikalnih problemov in ob tem utrdijo analitični način razmišljanja.	<u>Skill-transference Ability</u> The ability to autonomously follow the latest advances and literature in the field of technical and fire safety. Understanding of physical measurements and the ability of their critical evaluation.

**Metode poučevanja in učenja:**

Predavanja  
Vaje

**Learning and Teaching Methods:**

Lectures  
Problem solving

**Načini ocenjevanja:**

Izpit pisni in ustni.  
Ocene: 6-10 pozitivno.  
Vaje: Opravljen kolokvij.

Delež (v %) /  
Weight (in %)

**Assessment:**

Written and oral exam.  
Grades: 6-10  
Problem solving: written tests.

**Reference nosilca / Lecturer's References:**

1. J.C. Everts and **M. Ravnik**, Ionically charged topological defects in nematic fluids, Phys. Rev. X 11, 011054 (2021)
2. S. Copar, J. Aplinc, Z. Kos, S. Zumer and **M. Ravnik**, Topology of Three-Dimensional Active Nematic Turbulence Confined to Droplets, Phys. Rev. X 9, 031051 (2019)
3. **M. Ravnik**, G. P. Alexander, J. M. Yeomans, and S. Žumer, Three-dimensional colloidal crystals in liquid crystalline blue phases, Proc. Natl. Acad. Sci. USA 108, 5188 (2011)