



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

**Predmet:** Fizikalni eksperimenti 2  
**Course title:** Physics experiments 2

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Enovit magistrski študijski program druge stopnje Predmetni učitelj	/	2	3
Five-year master's degree program Subject Teacher	/		

**Vrsta predmeta / Course type**

Obvezni/Obligatory

**Univerzitetna koda predmeta / University course code:**

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
			40		50	3

**Nosilec predmeta / Lecturer:**

Robert Repnik

**Jeziki /**

**Predavanja / Lectures:**

slovenski/Slovene

**Languages:**

**Vaje / Tutorial:**

slovenski/Slovene

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

Predznanje iz elektromagnetizma in termodinamike.

**Prerequisites:**

Preknowledge of electromagnetism and thermodynamics.

**Vsebina:**

Predavanja: teoretični pregled vsebin laboratorijskih vaj.

Študent opravi 15 zahtevnejših vaj s področja termodinamike in elektromagnetizma.

Vsebine, ki so zastopane v vajah iz termodinamike so: odvisnost vrelišča vode od tlaka, temperaturno raztezanje, plinska enačba, specifična toplota trdnin in kapljevin, izparilna in talilna toplota.

**Content (Syllabus outline):**

Lectures: theoretical overview of the experiments.

Students perform 15 advanced experiments from thermodynamics and electromagnetism.

The experiments on thermodynamics contain: Clausius Clapeyrone equation, thermal expansion, ideal gas equation, specific heat of metals and liquids, heat of fusion, heat of vaporization.

Vaje z elektromagnetizma vsebujejo: električna vezja, notranji upor, temperaturni koeficient upora, merilniki temperature, električnega toka in napetosti, indukcija in generatorji, elektromotorji, elektroni v električnem in magnetnem polju, Coulombov zakon, Millikanov poskus, Hallov pojav.

The experiments on electromagnetism contain: electrical circuits, internal resistance, temperaturecurrent- and voltage-meters, induction and generators, electromotors, electrons in electric and magnetic field, Coulomb law, Millikan experiment, Hall effect.

#### Temeljni literatura in viri / Readings:

- Navodila za izvedbo vaj/ Guidelines for the experiments
- Sirkevič, Koškin: Priročnik elementarne fizike. Ljubljana: TZS, 1988.
- D. Halliday, R. Resnick, K. S. Krane, Physics, 5. izdaja, vol 1 in 2 (John Wiley & Sons, Inc., New York, (2002).
- J. Strnad, Fizika, 1. in 2. del, (DMFA, Ljubljana, 2002) Na spletnih straneh Oddelka za fiziko objavljena elektronska gradiva./ teaching material published on
- websites of Department of Physics

#### Cilji in kompetence:

Študenti usvojijo osnovno znanje s področja toplote, termodinamike in elektromagnetizma. Pridobijo si primerne izkušnje in laboratorijske spretnosti, potrebne za samostojno delo pri demonstracijah in eksperimentalnih vajah. Navadijo se uporabljati ustrezno strokovno literaturo, svoje teoretično in računsko znanje in tudi druge informacijske vire. Usvojijo znanja, potrebna za pripravo kvantitativnega in kvalitativnega eksperimenta. Usposobijo se precizno in adekvatno poročati o svojih eksperimentalnih ugotovitvah.

#### Objectives and competences:

Students refresh and extend the knowledge from heat, thermodynamics and electromagnetism. They also acquire experiences and laboratory skills that are essential for an autonomous execution of demonstrative physics experiments related to aboveoutlined topics. Finally, they learn how to use their theoretical and practical knowledge, as well as information offered from secondary sources, to master problems that might occur during experimental work and report on their findings

#### Predvideni študijski rezultati:

##### Znanje in razumevanje:

Razumevanje osnovnih procesov v naravi in sposobnost njihove demonstracije v primerno opremljenem laboratoriju.

##### Prenesljive/ključne spretnosti in drugi atributi:

Didaktični pristop pri obravnavi naravnih pojavov ter sposobnost prenesti znanje laiku; ali predlagati matematično ali fizikalno rešitev specifičnega problema, ter tako pripomoči k njegovi rešitvi in razvoju v raziskovalno orientiranem okolju

#### Intended learning outcomes:

##### Knowledge and understanding:

Understanding of basic processes in nature and the ability to demonstrate them in an appropriately equipped laboratory.

##### Transferable/Key Skills and other attributes

A didactic approach to real-life phenomena and the ability to transfer this knowledge to a non-specialist; or to provide a detailed and accurate description of a particular problem and propose mathematically and physically motivated solutions, thus facilitating development in a research oriented environment

#### Metode poučevanja in učenja:

#### Learning and teaching methods:

Metodika obsega: teoretičen uvod v obravnavano snov ter nadzorovano samostojno izvedbo eksperimentov.

They are based on: theoretical introduction to specific topics and an autonomous supervised execution of experiments.

Delež (v %) /

**Načini ocenjevanja:**

Weight (in %)

**Assessment:**

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Type (examination, oral, coursework, project):
Opravljenе laboratorijske vaje, izdelan dnevnik vaj in ustni zagovor vaj	<b>30</b>	Done experiments and the lab diary and the oral avocation of the experiment
Ustno ali pisno preverjanje pripravljenosti na vajo	<b>20</b>	Oral or written assessment of readiness for the forthcoming experiment
Pisni kolokvij	<b>20</b>	Written test
Ustni in praktični izpi	<b>30</b>	Oral and practical exam

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

KRAŠNA, Marjan, REPNIK, Robert, BRADAC, Zlatko, KRALJ, Samo. Sudden isotropic-nematic phase transition within a plan-parallel cell. *Mol. cryst. liq. cryst. (Phila. Pa. : 2003)*, apr. 2006, vol. 449, iss. 1, str. 127-135.

[COBISS.SI-ID 14668040], [JCR, WoS do 6. 11. 2012: št. citatov (TC): 2, čistih citatov (CI): 1, normirano št. čistih citatov (NC): 1, Scopus do 16. 10. 2012: št. citatov (TC): 2, čistih citatov (CI): 1, normirano št. čistih citatov (NC): 1]

REPNIK, Robert, BRADAC, Zlatko, MATHELITSCH, Leopold, KRALJ, Samo. Cosmology in the laboratory. V: 5th Liquid Matter Conference of the European Physical Society, Konstanz, 2002. *Abstracts book*, (Europhysics conference abstracts, Vol. 26F). [S. l.]: European Physical Society, 2002, str. 115-116. [COBISS.SI-ID 12039944]

KRALJ, Samo, REPNIK, Robert. Patterns in symmetry breaking transitions. V: LAMANAUSKAS, Vincentas (ur.). *Philosophy of mind and cognitive modelling in education - 2012*, (Problems of education in the 21st century, vol. 46). Siauliai: Scientific Methodological Center Scientia Educologica, 2012, str. 74-84, ilustr. [COBISS.SI-ID 19462920]

FERK, Eva, OSRAJNIK, Damjan, REPNIK, Robert. Planisphere in astronomy teaching in primary school - a successful tool for development of natural science competences. V: *International Conference on New Horizons in Education - 2010 : proceedings book*. [Famagusta: Sakarya University], 2010, str. 681-686, ilustr. [COBISS.SI-ID 17835272]

REPNIK, Robert, AMBROŽIČ, Milan, GRUBELNIK, Vladimir. Galileo on our web textbook on behalf of International year of astronomy 2009. V: AURER, Boris (ur.), BAČA, Miroslav (ur.), RABUZIN, Kornelije (ur.). 20th Central European Conference on Information and Intelligent Systems, September 23-25, 2009, Varaždin, Croatia. *Conference proceedings*. Zagreb: University of Zagreb; Varaždin: Faculty of Organisation and Informatics, 2009, str. 29-33. [COBISS.SI-ID 22984999]