



Univerza v Mariboru

**FAKULTETA ZA NARAVOSLOVJE  
IN MATEMATIKO**

Koroška cesta 160  
2000 Maribor, Slovenija  
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**OPIS PREDMETA / SUBJECT SPECIFICATION**

**Predmet:** Fizikalni eksperimenti I  
**Subject Title:** Physics experiments I

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Izobraževalna fizika Educational Physics		1	2

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

Seminar Seminar	Sem. vaje Tutorial	Lab. Vaje Lab. Work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
		40		80	4

**Nosilec predmeta / Lecturer:** Andrej Dobovišek

**Jeziki / Predavanja / Lecture:** slovenski / Slovenian  
**Languages: Vaje / Tutorial:** slovenski / Slovenian

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

Potrebno je predznanje iz mehanike, termodinamike in elektrike.

**Vsebina:**

Predavanja: teoretičen pregled vsebin laboratorijskih vaj.

Študent opravi 15 laboratorijskih vaj s področja mehanike, termodinamike in elektrike.

V projektni nalogi študent obdela zahtevnejšo merilno tehniko in pripravi ali izdelava zahtevnejši eksperiment in o njem poroča.

**Prerequisites:**

Preknowledge of mechanics, thermodynamics and electricity

**Contents (Syllabus outline):**

Lectures: theoretical overview of the experiments.

Students perform 15 laboratory experiments from mechanics, thermodynamics and electricity.

In scope of the project work each student studies an advanced measurement technique and builds an advanced experiment and reports on the project.

**Temeljni študijski viri / Textbooks:**

- 1) Interna navodila za izvedbo vaj/ Guidelines for of the experiments
- 2) Sirkevič, Koškin: *Priročnik elementarne fizike*. Ljubljana: TZS, 1988.
- 3) D. Halliday, R. Resnick, J. Walker, *Fundamentals of Physics*, 5. izdaja, (John Wiley & Sons, Inc., New York, 1997)
- 4) J. Strnad, *Fizika*, 1. in 2. del, (DMFA, Ljubljana, 2002)

**Cilji:**

**Objectives:**

Študentje ponovijo in poglobijo znanje s področja mehanike, termodinamike in elektrike pridobljeno na predavanjih, ki je neobhodno potrebno za uspešno izvedbo in razumevanje eksperimentalnih vaj. 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.

**Predvideni študijski rezultati:**

Students refresh and extend their knowledge of mechanics, thermodynamics and electricity obtained by attending lectures, especially topics that are essential for the successful and correct execution of laboratory work. Students also acquire experience and laboratory skills that is essential for an autonomous execution of demonstrative physics experiments related to above-outlined 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.

**Intended learning outcomes:**

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.

**Metode poučevanja in učenja:**

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.

**Learning and teaching methods:**

Metodika obsega: teoretičen uvod v obravnavano snov ter samostojno izvedbo eksperimentov pod mentorstvom profesorja.

They are based on: theoretical introduction to specific topics and an autonomous execution of experiments under the supervision of the professor.

**Načini ocenjevanja:**

Delež (v %) /  
Weight (in %)

**Assessment:**

Ustno preverjanje pripravljenosti na vaje	10%	Oral assessment of readiness for the forthcoming experiment
Opravljene eksperimentalne vaje	20%	Done laboratory experiments
Izdelana poročila o vajah	10%	Done laboratory reports
Ustni zagovori vaj	20%	Oral avocation of the experiments
Pisni kolokvij	20%	Written test
Projektna naloga	20%	Project work

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

1. DOBOVIŠEK, Andrej, FAJMUT, Aleš, BRUMEN, Milan. Strategy for NSAID administration to aspirin-intolerant asthmatics in combination with PGE [sub] 2 analogue: a theoretical approach. *Med. biol. eng. comput.*. [Print ed.], 2012, vol. 50, no. 1, str. 33-42, doi:[10.1007/s11517-011-0844-x](https://doi.org/10.1007/s11517-011-0844-x). [COBISS.SI-ID [18845192](https://www.cobiss.si/id/18845192)]

2. DOBOVIŠEK, Andrej, ŽUPANOVIĆ, Paško, BRUMEN, Milan, BONAČIĆ LOŠIĆ, Željana, KUIĆ, Domagoj, JURETIĆ, Davor. Enzyme kinetics and the maximum entropy production principle. *Biophysical chemistry*. [Print ed.], 2011, vol. 154, iss. 2/3, str. 49-55,

doi: [10.1016/j.bpc.2010.12.009](https://doi.org/10.1016/j.bpc.2010.12.009). [COBISS.SI-ID [18206984](#)]

**3.** DOBOVIŠEK, Andrej, FAJMUT, Aleš, BRUMEN, Milan. Role of expression of prostaglandin synthases 1 and 2 and leukotriene C [sub] 4 synthase in aspirin-intolerant asthma: a theoretical study. *Journal of pharmacokinetics and pharmacodynamics*, 2011, vol. 38, no. 2, str. 261-278, doi: [10.1007/s10928-011-9192-6](https://doi.org/10.1007/s10928-011-9192-6). [COBISS.SI-ID [18203144](#)]

**4.** ŽUPANOVIĆ, Paško, KUIĆ, Domagoj, JURETIĆ, Davor, DOBOVIŠEK, Andrej. On the problem of formulating principles in nonequilibrium thermodynamics. *Entropy (Basel, Online)*, 2010, vol. 12, no. 4, str. 926-931. <http://www.mdpi.com/1099-4300/12/4/926/pdf>, doi: [10.3390/e12040926](https://doi.org/10.3390/e12040926). [COBISS.SI-ID [17555976](#)]

**5.** BRUMEN, Milan, FAJMUT, Aleš, DOBOVIŠEK, Andrej, ROUX, Etienne. Mathematical modelling of Ca<sup>2+</sup> oscillations in airway smooth muscle cells. *Journal of biological physics*, 2005, 31, str. 515-524. [COBISS.SI-ID [14363656](#)]

**6.** FAJMUT, Aleš, DOBOVIŠEK, Andrej, BRUMEN, Milan. Mathematical modeling of the relation between myosin phosphorylation and stress development in smooth muscles. *J. chem. inf. mod.*, 2005, [Vol.] 45, str. 1610-1615. [COBISS.SI-ID [14353672](#)]

**7.** FAJMUT, Aleš, DOBOVIŠEK, Andrej, BRUMEN, Milan. Mathematical modelling in aspirin-induced asthma : theory and clinical applications. V: BİSLİMİ, Adelina H. (ur.), TOLKA, Lulezime C. (ur.). *Asthma : causes, complications and treatment*, (Pulmonary and respiratory diseases and disorders). New York: Nova Science Publishers, cop. 2012, str. 1-32. [COBISS.SI-ID [19556360](#)]