

**UČNI NAČRT PREDMETA / COURSE SYLLABUS**

<b>Predmet:</b>	Fizika za inženirje
<b>Course title:</b>	Physics for Engineers

Študijski program <i>Study program and level</i>	Študijska smer <i>Study field</i>	Letnik <i>Academic year</i>	Semester <i>Semester</i>
Inženiring in vozila, prva stopnja	-	prvi	prvi
Engineering and vehicles, first level	-	first	first

<b>Vrsta predmeta / Course type</b>	obvezni	obligatory
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<b>Univerzitetna koda predmeta / University course code:</b>	VS_11005
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Predavanja <i>Lectures</i>	Seminar <i>Seminar</i>	Sem. vaje <i>Tutorials</i>	Lab. vaje <i>Laboratory work</i>	Teren. vaje <i>Fieldwork</i>	Samost. delo <i>Individ. work</i>	ECTS
45	-	15	30	-	90	6

<b>Nosilec predmeta / Lecturer:</b>	doc. dr. Ted Prodan
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<b>Jeziki / Languages:</b>	<b>Predavanja / Lectures:</b>	<b>Vaje / Tutorials:</b>
	Slovenski	Slovenski
	Slovenian	Slovenian

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

**Prerequisites:**

- vpis v prvi letnik študija	- enrolment in the first year of study
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**Vsebina:**

**Content (Syllabus outline):**

<ul style="list-style-type: none"> <li>- Uvod: osnove naravoslovne metode, modeliranje in vrednotenje modelov z eksperimentom, merjenje, fizikalne količine in enote.</li> <li>- Kinematika in dinamika masne točke in togega telesa: premo gibanje, kroženje, Newtonovi zakoni, delo, energija, moč, gibalna količina, vrtilna količina.</li> <li>- Nihanje in valovanje: harmonična nihanja, nedušena in dušena nihanja, vsiljeno nihanje in resonanca, potujoče in stoječe valovanje, valovni pojavi.</li> <li>- Termodinamika: definicija absolutne temperature, temperaturno raztezanje trdnin in kapljevlin, enačba stanja idealnega plina, notranja energija in toplota, prenosi toplote, toplotni stroji.</li> </ul>	<ul style="list-style-type: none"> <li>- Introduction: fundamentals of the scientific method, modeling and evaluation of models with experiments, measuring, physical quantities and units.</li> <li>- Kinematics and dynamics of mass a point and rigid body: linear motion, circular motion, Newton's laws, work, energy, power, linear momentum, angular momentum.</li> <li>- Oscillations and waves: harmonic oscillations, undamped and damped oscillations, forced oscillations and resonance, traveling and standing waves, wave phenomena.</li> <li>- Thermodynamics: definition of absolute temperature, thermal expansion of solids and liquids, state equation of ideal gases, internal energy and heat, heat transfers, heat engines.</li> </ul>
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**Temeljni literatura in viri / Readings:**

- Črepinšek, L., Padežnik Gomilšek, J. (2002). Tehniška fizika. Fakulteta za strojništvo Maribor: Maribor.
- Borštnik, B. (2011). Fizika za študente visokih šol. DMFA: Ljubljana.
- Horvat, D., Možina, J., Petkovšek, R. (2007). Naloge iz tehniške fizike. Fakulteta za strojništvo: Ljubljana.
- Padežnik Gomilšek, J., Črepinšek, L. (2001). Naloge iz tehniške fizike. Fakulteta za strojništvo, Univerza v Mariboru: Maribor.
- E-gradiva predmeta / E-Course material

**Priporočljiva literatura / Recommended literature:**

- Halliday, D., Resnick, R., & Walker, J. (1997). Fundamentals of Physics. John Wiley & Sons: New York
- Serway, R. A., Jewett, J. W. (2003). Physics for Scientists and Engineers. Thompson Brooks/Cole: London

**Cilji in kompetence:**

- Cilji**
- obravnava fizike kot znanstvene podlage za delo inženirjev,
  - seznanitev z osnovnimi fizikalnimi principi in njihovo uporabo v tehniki,
  - analiza tehniških problemov s fizikalno metodo obravnave naravnih pojavov,
  - izvajanje in dokumentiranje eksperimentov iz obravnavanih področij ter presoja njihove natančnosti,
  - priprava študentov na študij strokovnih predmetov.
- Kompetence**
- sposobnost reševanja problemov z matematičnimi orodji in celosten pristop k reševanju problemov,
  - sposobnost prepoznavanja tehniškega problema in njegovega obravnavanja s stališča fizike,
  - sposobnost kompleksnega razmišljanja,
  - razvoj socialnih spretnosti in timskega dela s skupinskim reševanjem problemov.

**Objectives and competences:**

- Objectives**
- consideration of physics as the scientific basis for the work of engineers,
  - to acquaint students with the basic physical principles and their application in engineering,
  - analysis of technical problems with the physical method of investigation of natural phenomena,
  - Implementation and documentation of experiments in the respective fields and the assessment of their accuracy,
  - preparing students to study technical subjects.
- Competences**
- the ability to solve problems using mathematical tools and an integrated approach to problem solving,
  - the ability to identify the technical problem and to work with it from the physics standpoint,
  - the ability of complex thinking,
  - development of social skills and teamwork through groups' problem solving.

**Predvideni študijski rezultati:**

- Študent/študentka:**
- pozna in razume osnovne fizikalne zakone z obravnavanih področij,
  - zna postavljati matematične modele preprostih tehniških sistemov in vrednotiti rezultate teh modelov,
  - razume osnovne principe fizikalnega razmišljanja, kot so kritično mišljenje, ustvarjalno mišljenje in sprejemanje odločitev,
  - zna uporabiti pridobljeno znanje za analizo lažjih tehniških problemov,
  - zna načrtovati, postaviti in izvesti eksperiment ter ovrednotiti in interpretirati rezultate meritev,
  - zna dokumentirati celoten potek eksperimentalnega dela

**Intended learning outcomes:**

- Student:**
- knows and understands the basic physical laws in the studied fields,
  - knows how to set up mathematical models of simple engineering systems and evaluate the results of these models,
  - understands the basic principles of physical thought, such as critical thinking, creative thinking and decision making,
  - is able to apply acquired knowledge to analyze simple technical problems,
  - ability to plan, build and implement an experiment and evaluate and interpret the results of measurements,
  - ability to document the entire course of experimental work

**Metode poučevanja in učenja:**

- *predavanja* z aktivno udeležbo študentov
- *seminarske vaje*, pri katerih študenti na praktičnih primerih poglobljajo osvojeno teoretično znanje
- *laboratorijske vaje*, pri katerih se študenti izvajajo eksperimente in pripravijo poročila o opravljenih

**Learning and teaching methods:**

- *lectures* with active participation of students
- *tutorials*, in which students deepen their acquired theoretical knowledge by solving practical problems,
- *laboratory work*, in which students perform

<p>eksperimentih</p> <p>Predmet je oblikovan na kombinirani način študija, ki vključuje aktivnosti preko elektronskega (on-line) okolja:</p> <p>te aktivnosti so sestavljene iz samostojnih in skupinskih aktivnosti z uporabo učnega okolja Moodle in drugih elektronskih vsebin. Praviloma vključujejo diskusije v forumih, spletne strani, ogled posnetih predavanj in vaj, preverjanje znanja, odgovori na vprašanja, iskanje po spletu (bazah) itd.</p>	<p>experiments and prepare reports on the experiments</p> <p>The course is designed as blended learning that includes online activities:</p> <p>Online activities consist of independent and group activities using the LMS Moodle and other electronic or online content. Activities usually include discussions in forums, websites, viewing of recorded lectures and tutorials, assessments, answering questions, searching the web (databases), etc.</p>
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Načini ocenjevanja:	Delež/ Weight (%)	Assessment:
<ul style="list-style-type: none"> <li>- laboratorijske vaje</li> <li>- pisni izpit</li> </ul> <p>Ocenjevalna lestvica je skladna z ECTS in Pravilnikom o preverjanju in ocenjevanju znanja FINI NM.</p>	<p>20%</p> <p>80%</p>	<ul style="list-style-type: none"> <li>- <i>laboratory work</i></li> <li>- <i>written exam</i></li> </ul> <p>Evaluation scale in accordance with ECTS and the Rules on the Evaluation and Assessment of Knowledge FINI NM.</p>

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

<ul style="list-style-type: none"> <li>- KRALJ, Aleš, PRODAN, Ted, EMRI, Igor. An apparatus for measuring the effect of pressure on the time-dependent properties of polymers. Journal of rheology, ISSN 0148-6055, 2001, vol. 45, no. 4, str. 929-943. [COBISS.SI-ID 4847131]</li> <li>- EMRI, Igor, PRODAN, Ted. A measuring system for bulk and shear characterization of polymers. Experimental mechanics, ISSN 0014-4851. Tiskana izd., 2006, letn. 46, št. 4, str. 429-439. [COBISS.SI-ID 9497627]</li> <li>- RITUMS, J.E., HEDENQVIST, M.S., BERGMAN, Gunnar, PRODAN, Ted, EMRI, Igor. Sorption behavior in polymers above Tg : relations between mechanical properties and swelling in limonene. Polymer engineering and science, ISSN 0032-3888, 2005, letn. 45, št. 9, str. 1194-1202. <a href="http://dx.doi.org/10.1002/pen.20392">http://dx.doi.org/10.1002/pen.20392</a>. [COBISS.SI-ID 8413723]</li> <li>- BLINC, Robert, APIH, Tomaž, JEGLIČ, Peter, EMRI, Igor, PRODAN, Ted. Proton NMR study of molecular motion in bulk and in highly drawn fiber polyamide-6. Applied magnetic resonance, ISSN 0937-9347, 2005, vol. 29, str. 577-588. [COBISS.SI-ID 19653671]</li> <li>- PRODAN, Ted, ZELENIČ, Alenka. Projekt "PRIME" (Primorsko podjetništvo) : primer uspešnega sodelovanja in razvoja inovativnosti na slovensko-italijanskem obmejnem območju. EIC novice, ISSN 1408-7235, Avg. 2006, str. 9, ilustr. [COBISS.SI-ID 29196293]</li> <li>- PRODAN, Ted, EMRI, Igor. Pressure influence on mechanical properties of viscoelastic materials. V: ATEM '99: proceedings of the International Conference on Advanced Technology in Experimental Mechanics '99, Ube City, Japan, July 21 through 24, 1999. Tokyo: JSME. cop. 1999, vol. 1, str. 23-31. [COBISS.SI-ID 3544603]</li> <li>- PRODAN, Ted, KRALJ, Aleš, EMRI, Igor. Apparatus for pressure and temperature material characterization. V: BINDING, David M. (ur.), et al. Proceedings of the XIIIth International Congress on Rheology, Cambridge, United Kingdom, 20th to 25th August 2000. Glasgow: British Society of Rheology. 2000, vol. 4, str. 73-75. [COBISS.SI-ID 4281115]</li> <li>- PRODAN, Ted. Shape deposition manufacturing for building injection molding tools. V: KUZMAN, Karl (ur.), BALIČ, Jože (ur.). Conference proceedings, 2nd International Conference on Industrial Tools ICIT '99, Rogaška Slatina &amp; Maribor, Slovenia, April 18-22, 1999. Celje: TECOS, Slovenian Tool and Die Development Centre. 1999, vol. 2, str. 468-473. [COBISS.SI-ID 3257115]</li> <li>- PRODAN, Ted. Uporaba konstrukcijskega standarda ASME-X za kompozitne izdelke. V: ŠVETAK, Darko (ur.). Vir znanja in izkušenj za stroko : zbornik foruma, [9.] industrijski forum IRT, Portorož, 5. in 6. junij 2017. Škofljica: Profidtp. 2017, str. 251-254, ilustr. [COBISS.SI-ID 15614747]</li> </ul>
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