Univerza v Mariboru

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Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Energija za človekovo uporabo
Course title:	Energy for Human Use

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Fizika 2. st.		2	**3**
Physics 2nd degree		2	**3**

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
15			15	15	105	**5**

Nosilec predmeta / Lecturer: Aleksander Zidanšek

Jeziki / **Languages:**	**Predavanja / Lectures:**	slovenski/Slovenian in/and angleški/English
	Vaje / Tutorial:	slovenski/Slovenian in/and angleški/English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Predznanje osnov fizike – termodinamike	Knowledge of classical physics - thermodynamics

Vsebina:	**Content (Syllabus outline):**
1. Energija Energija v fiziki, viri energije 2. Osnove termodinamike Energijski zakon, prenos toplote; energija iz fosilnih goriv; toplotni stroji; shranjevanje in transport energije. 3. Termodinamske omejitve energijskih pretvorb	1. Energy Energy in physics, sources of energy 2. Fundamentals of Thermodynamics Energy law, heat transfer; fossile fuel energy; heat engine; storage and transport of energy. 3. Termodynamic Limits of Energy Transformatinos

Entropijski zakon, motor z notranjim izgorevanjem, izkoristek <u>4. Okoljski učinki pridobivanja energije</u> Energija in okolje: zmanjševanje onesnaženja; cena energijskih transformacij. Obnovljivi energijski viri: sončna energija, energija vetra, valovi, biološki viri energije. Jedrska energija: zlitje, cepitev, varnost in sevanje, jedrski odpadki in varnost. Gorivne celice: gorivne celice z membrano za izmenjavo protonov; energijski viri za gorivne celice. Vodik: biološki viri pridobivanja, bakterije in alge.	Enthropy law, internal combustion engine, energy efficiency <u>4. Environmental Effects of Energy Production</u> Energy and natural environment: reduction of pollution; price of energy transformations. Renewable energy sources: solar energy, wind energy, tidal energy, biological sources of energy. Nuclear energy: fusion, fision, safety and radiation, nuclear waste and security. Fuel cells: proton exchange membrane fuel cells. Hydrogen: biological sources, bacteria and algae.

Temeljni literatura in viri / Readings:

1) Jefferson W. Tester, Michael J. Driscoll, William A. Peters, Elisabeth M. Drake, Michael W. Golay , Sustainable Energy: Choosing among Options, MIT Press, Cambridge 2005 .
2) Egbert Boeker, Rienk van Grondelle, Environmental Science: Physical Principles and Applications, John Wiley & Sons, New York 2001.
3) J. Nelson, Physics of Solar Cells, Imperial College Press. London 2003.
4) Članki v revijah New Scientist, Scientific World in Computational Physics

Cilji in kompetence:	**Objectives and competences:**
Kandidat spozna načine kroženja energije v naravi in vpliv človekove rabe energije na okolje. Kandidat spozna predvsem tiste energijske vire, ki so do okolja prijazni, in tiste, ki predstavljajo potencialno nevarnost za okolje. Kandidat se nauči objektivno in kritično presojati vpliv posameznih načinov pridobivanja energije na ljudi in okolje.	Students learn about energy flows in nature and the environmental impact of human energy use. Students learn new environmentally friendly energy sources, as well as those that represent potential risks for environment. The candidates also learn to assess critically the impact of different energy sources on humans and environment.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Razumevanje načinov kroženja in pridobivanja energije ter vpliva energijskih virov na okolje. **Prenesljive/ključne spretnosti in drugi atributi:** Predmet pripravlja študenta za delo na fizikalnih projektih s področja energetike in okoljevarstva.	**Knowledge and Understanding:** Understanding of energy flow and production as well as the environmental impact of energy sources. **Transferable/Key Skills and other attributes:** Subject prepares the student for work on some physics projects in energy and environmental protection.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Metodika obsega: teoretičen uvod v obravnavano snov, laboratorijske in terenske vaje v različnih naravnih okoljih.	They are based on: theoretical introduction to specific topics, laboratory and field work comprising also exercises in different natural environments.

Delež (v %) /

Načini ocenjevanja:	Weight (in %)	**Assessment:**
• projektna naloga • ustni izpit	50 % 50 %	• project • oral examination

Reference nosilca / Lecturer's references:

ZIDANŠEK, Aleksander, AMBROŽIČ, Milan, MILFELNER, Maja, BLINC, Robert, LIOR, Noam. Solar orbital power : sustainability analysis. Energy (Oxford). [Print ed.], 2011, vol. 36, no. 4, str. 1986-1995. [COBISS.SI-ID 24602919]

KABASHI, Skender, BEKTESHI, Sadik, AHMETAJ, Skender, KABASHI, Gazmed, NAJDOVSKI, Dimitrij, ZIDANŠEK, Aleksander, ŠLAUS, Ivo. Effects of Kosovo's energy use scenarios and associated gas emissions on its climate change and sustainable development. Appl. energy. [Print ed.], 2010, vol. 88, no. 2, str. 473-478. [COBISS.SI-ID 24118823]

ZIDANŠEK, Aleksander, BLINC, Robert, JEGLIČ, Anton, KABASHI, Skender, BEKTESHI, Sadik, ŠLAUS, Ivo. Climate changes, biofuels and the sustainable future. Int. j. hydrogen energy. [Print ed.], 2009, vol. 34, no. 16, str. 6980-6983. [COBISS.SI-ID 22976551]

BLINC, Robert, NAJDOVSKI, Dimitrij, BEKTESHI, Sadik, KABASHI, Skender, ŠLAUS, Ivo, ZIDANŠEK, Aleksander. How to archieve a sustainable future for Europe?. Therm. sci., 2008, vol. 12, no. 4, str. 19-25, doi: 10.2298/TSCI0804019B. [COBISS.SI-ID 22250023]

BLINC, Robert, ZIDANŠEK, Aleksander, ŠLAUS, Ivo. Sustainable development and global security. Energy (Oxford). [Print ed.], 2007, vol. 32, str. 883-890. [COBISS.SI-ID 19598631]