

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Obnovljivi viri energije in sonaravni razvoj
Course title:	Renewable energy sources and sustainable development

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Poslovna informatika, magistrski študijski program druge stopnje	-	Prvi ali drugi	Drugi ali tretji
Business Informatics, second cycle Master's study programme	-	First or second	Second or third

Vrsta predmeta / Course type

Izbirni / Elective

Univerzitetna koda predmeta / University course code:

4-PI-MAG-IP-OVESR-2022-05-27

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30	0	30	0	0	90	5

Nosilec predmeta / Lecturer:

Prof. dr. Simon Muhič

Jeziki / Languages:

Predavanja / Lectures:	Slovenski / Slovenian, Angleški / English
Vaje / Tutorials:	Slovenski / Slovenian, Angleški / English

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

Študent/študentka mora pred pristopom k izpitu pripraviti in zagovarjati seminarsko nalogo.

Prerequisites:

The student is obliged to prepare and defend his/her seminar paper before the admission to the examination.

Vsebina:**Content (Syllabus outline):**

- Osnove o energiji in pretvorljivosti energij, zakoni termodinamike
- Osnove obnovljivih virov energije
- Sončno sevanje in učinek tople grede
- Ogrevanje s soncem (sprejemniki sončne energije).
- Fotonapetostne celice in njihova uporaba.
- Energija vode in vetra.
- Geotermalna energija.
- Biomasa.
- Osnove energijskih sistemov (energijski sistem, tehnologije distribucije).
- Meje sonaravne rasti.

- The fundamentals of energy, energy transformation and laws of thermodynamics.
- The fundamentals of renewable energy sources.
- Solar radiation and greenhouse effect.
- Solar heating.
- Photovoltaics and its usage.
- Hydro and wind energy.
- Geothermal energy.
- Biomass.
- The fundamentals of energy systems (energy system, distribution technologies).
- The Limits to Growth.

Temeljni literatura in viri / Foundational literature and sources:

- Medved, S. in Novak, P. (2000). *Varstvo okolja in obnovljivi viri energije*. Ljubljana: Univerza v Ljubljani Fakulteta za strojništvo.
- Muhič, S., Blagojevič, B. (2016). *Tehniška termodinamika*. 1. izd. Novo mesto: Fakulteta za tehnologije in sisteme (izbrana poglavja: Uvod v termodinamiko, Prvi glavni zakon termodinamike, Drugi glavni zakon termodinamike, Delovni procesi).
- Tuma, M., Sekavčnik, M. (2004) *Energetski sistemi – preskrba z električno energijo in toploto*, 3. izdaja. Ljubljana: Fakulteta za strojništvo, UL.

Priporočljiva literatura:

- Meadows, D. H., Meadows, D. L., Randers, J., Behrens, W. W. III (1972). *The Limits to Growth. Report for the Club of Rome's project on the predicament of mankind*. Potomac Associates.
- Meadows, D., Randers, J., Meadows, D. (2004). *Limits to Growth: The 30-Year Update*. Chelsea Green Publishing.

Cilji in kompetence:

Učna enota prispeva predvsem k razvoju naslednjih splošnih in specifičnih kompetenc:

Splošne kompetence:

- Uporaba pomena kakovosti in prizadevanje za kakovost

Objectives and competences:

The learning unit mainly contributes to the development of the following general and specific competences:

General competences:

- Usage of the importance of quality and striving for the quality of

strokovnega dela skozi avtonomnost, samoiniciativnost, (samo)kritičnost, (samo)refleksivnost in (samo)evalviranje.

- Sposobnost fleksibilne uporabe znanja v praksi.

Predmetno-specifične kompetence:

- analiza procesov (delovnih, krožnih, termodinamičnih, ...) v okolju ter predvidevanje rešitev oz. posledic,
- interdisciplinarno celovito kritično mišljenje, sposobnost analize, sinteze in predvidevanje rešitev,
- uporaba postopkov, procesov in tehnologij za reševanje okoljskih problemov,
- obravnava obnovljivih virov energije in njihovih okoljskih vidikov,
- analiza stanja, ciljev in ukrepov podnebnih sprememb,
- razvoj in uvajanje sodobnih okoljskih rešitev v sodobno družbo,
- sposobnost uporabe okoljskih tehnologij v sodobni družbi.

professional work through autonomy, self-initiative, as well as (self-)criticism, (self-)reflection and (self-)evaluation.

- The ability of flexible usage of knowledge in practice.

Subject-specific competences:

- Analysis of processes (working, circular and thermodynamic, ...) in the environment and anticipate solutions or predict consequences,
- comprehensive interdisciplinary critical thinking, ability to analyze, synthesize and anticipate solutions,
- usage of procedures, processes and technologies to solve environmental problems
- to address renewable energy sources and their environmental aspects,
- analysis of the status, objectives and actions of climate change,
- development and implementation of modern environmental solutions in contemporary society,
- the ability to use environmental technologies in contemporary society.

Predvideni študijski rezultati:

Študenti bodo zmožni:

- primerjati različne načine pretvarjanja energij,
- vrednotiti obnovljive vire energije,
- argumentirati pomen obnovljivih virov energije (OVE) za energetske oskrbo,
- razviti sposobnost ocenjevanja primernosti posameznih rešitev implementacije okolju prijaznih tehnologij,
- kritično presoditi vplive OVE na okolje in družbo, ki nastanejo pri njihovi uporabi.

Intended learning outcomes:

- Students will be able to: compare different aspects of energy conversion processes,
- evaluate renewable energy sources,
- argue the importance of renewable energy for energy supply,
- develop skills for evaluation of different solutions for the implementation of environmentally friendly technologies,
- critically evaluate the renewable energy sources usage for the environment and society arising from their use.

Metode poučevanja in učenja:

- predavanja z aktivno udeležbo študentov (razlaga, diskusija, vprašanja, primeri, reševanje problemov)
- laboratorijske vaje (uporaba računskih orodij, kot je npr. RETScreen)
- individualne in skupinske konzultacije (diskusija, dodatna razlaga, obravnava specifičnih vprašanj)

Learning and teaching methods:

- lectures with active students' involvement (explanation, discussion, questions, examples, problem solving)
- laboratory work (usage of numerical tools as is e. g. RETScreen)
- individual and group consultations (discussions, supplementary explanations, treatment of specific questions)

Načini ocenjevanja:

Delež (v %) /
Weight (in
%)

Assessment:

<p>Način (pisni izpit, ustno izpraševanje, naloge, projekt):</p> <ul style="list-style-type: none"> • pisni izpit • seminarska naloga in predstavitev naloge 	<p>50 50</p>	<p>Type (examination, oral, coursework, project):</p> <ul style="list-style-type: none"> • written examination • seminar paper and its presentation
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Reference nosilca / Lecturer's references:

- MUHIČ, Simon (avtor, avtor dodatnega besedila), BLAGOJEVIĆ, Bogdan (avtor, avtor dodatnega besedila). Tehniška termodinamika. Novo mesto: Fakulteta za tehnologije in sisteme, 2016. 269 str., sl., tabele. ISBN 978-961-6770-34-7. [COBISS.SI-ID 284615680]
- DROSATOS, Panagiotis, MUHIČ, Simon, et al. Numerical Investigation of a Coal-Fired Power Plant Main Furnace under Normal and Reduced-Oxygen Operating Conditions. Journal of energy engineering. okt. 2017, vol. 143, iss. 5, 14 str., ilustr. ISSN 0733-9402. [http://ascelibrary.org/doi/10.1061/\(ASCE\)EY.1943-7897.0000480](http://ascelibrary.org/doi/10.1061/(ASCE)EY.1943-7897.0000480), DOI: 10.1061/(ASCE)EY.1943-7897.0000480. [COBISS.SI-ID 514689399]
- MUHIČ, Simon, ČIKIČ, Ante, PIŠTAN, Jadran, STOJKOV, Marinko, BOŠNJAKOVIĆ, Mladen. Transport emissions and electric mobility in private transport in the Republic of Slovenia. Tehnički glasnik. 2018, letn. 12, št. 2, str. 98-103, tabele, graf. prikazi. ISSN 1848-5588. <https://hrcak.srce.hr/202360>. [COBISS.SI-ID 514791543]
- MAZEJ, Mitja, MUHIČ, Simon, ŠTURM, Milan, NOVAK, Peter. Low exergy thermal barrier system for indirect heating and cooling of residential buildings. V: ANDRASSY, Mladen (ur.). Interklima 2013 : [zbornik radova]. Zagreb: Sveučilište

u Zagrebu, Fakultet strojarstva i brodogradnje, 2013. [12] str., ilustr. [COBISS.SI-ID 513640055]

- MUHIČ, Simon (avtor, vodja projekta), PAROUSSOS, Leonidas (avtor, vodja projekta), CAPROS, Pantelis, NOVAK, Peter, LIPEJ, Andrej, ZUPANČIČ, Barbara. Priprava dolgoročnih energetske bilanc do leta 2035 in okvirno do leta 2055 : končno poročilo = Preparation of long term energy balances until 2035 and indicatively till 2055 : final report. Novo mesto: Fakulteta za tehnologije in sisteme; Athens (Greece): E3 Modelling, 2017. III, 155 f., ilustr. [COBISS.SI-ID 514636663]