

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet	Energetski sistemi in tehnologije
Course title	Energy Systems and Technologies

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Tehnologije in sistemi v strojništvu/ 2. stopnja	Ni smeri študija	2. letnik	3.
Technologies and systems in mechanical engineering/ 2 nd Cycle	No study field	2 nd year	3 rd

Vrsta predmeta/Course type

Izbirni/elective

Univerzitetna koda predmeta/University course code

TSS IP UN 1

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30			30		120	6

Nosilec predmeta/Lecturer:

prof. dr. Ivan Bajsić

Jeziki/ Predavanja/Lectures:
Languages: Vaje/Tutorial:

slovenski/Slovenian

Slovenski/Slovenian

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

Prerequisites:

- Končan prvi letnik študijskega programa.
- Osnovna znanja iz termodinamike
- Študent mora pred izpitom pripraviti in predstaviti ter zagovarjati projektno seminarsko nalogo.

- Finalized first year of study.
- Basic knowledge of thermodynamics.
- Student has to prepare, present and defend a project seminar before the exam.

Vsebina:

Content (Syllabus outline):

- *Uvod (vsebina).*
- *Energijski in energetski sistemi*
- *Energija in okolje*
- *Sonaravni viri energije*
- *Sonaravni energijski sistem*
- *Transformacija energije – problem kakovosti in količine*

- *Introduction (content).*
- *Energy and energy systems*
- *Energy and environment*
- *Sustainable energy sources*
- *Sustainable energy system*
- *Energy transformation - the problem of quality and quantity*

<ul style="list-style-type: none"> • <i>Sistemi za prenos energentov:</i> plinski sistem, elektroenergijski sistem, daljinski sistemi gretja in hlajenja • <i>Sonaravni distribuirani in hibridni sistemi</i> <ul style="list-style-type: none"> ○ Toplotni sistemi ○ Električni sistem ○ Topotne črpalke ○ Gorivne celice ○ Shranjevanje energije • <i>Vloga biomase v sonaravnem energijskem sistemu,</i> • <i>Kako v prehodnem obdobju?</i> 	<ul style="list-style-type: none"> • <i>Energy transmission systems:</i> gas system, electricity system, district heating and cooling systems • <i>Sustainable distributed and hybrid systems</i> <ul style="list-style-type: none"> ○ Thermal systems ○ Electrical system ○ Heat pumps ○ Fuel cells ○ Energy storage • <i>The role of biomass in a sustainable energy system,</i> • <i>How in the transition period?</i>
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Temeljna literatura in viri/Readings:

Temeljna literatura/Basic literature:

- MEDVED, S. in P. NOVAK. *Varstvo okolja in obnovljivi viri energije.* Ljubljana: UL-FS, 2000. ISBN 961-6238-35-3
- DA ROSA, A. *Fundamentals of Renewable Energy Processes.* Elsevier Academic Press, 2022 ISBN 13: 978-0-12-088510-7
- TWIDELL, J. in T. WEIR. *Renewable Energy resources.* Taylor&Francis, 2022. ISBN 978-415-58437-1(hbk)

Priporočljiva literatura/Recommended literature

- FRICKE, J. in W. BORST. *Essentials of Energy Technology.* Willey, 2013. ISBN: 978-3-527-33416-2
- MAJDANDŽIĆ, L. *Solarni sustavi.* Zagreb: Graphis, 2010. ISBN 978-953-279-027-6
- ABDULACH, M. O. *Applied Energy, an introduction.* CRC Press, © 2013 by Taylor & Francis Group, LLC, 2013. ISBN13: 978-1-4665-7608-7 (eBook - PDF)

Cilji in kompetence:

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

- sposobnost evidentiranja problema in njegove analize ter predvidevanja operativnih rešitev v tehnološkem smislu ali v procesu organizacije in vodenja,
- sposobnost obvladovanja standardnih razvojnih metod, postopkov in procesov,
- pridobitev poglobljenega znanja o problemih URE,
- sposobnost uporabe pridobljenega znanja v praksi,
- sposobnost obvladovanja razvoja,
- sposobnost razumevanja in reševanja konkretnih energijskih problemov,

Objectives and competences:

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

- the ability to record the problem and its analysis and to anticipate operational solutions in technological terms or in the process of organization and management,
- ability to master standard development methods, procedures and processes,
- gain in-depth knowledge of EUE problems,
- ability to apply the acquired knowledge in practice,
- ability to manage development,

<ul style="list-style-type: none"> • suverenost in avtonomnost na področju strokovnega dela, • sposobnost za svetovalno delo in sposobnost prenosa znanja drugim, • kooperativnost, usposobljenost za timsko delo, • razvoj strokovnih veščin in spretnosti na področju tehnologij in sistemov, • usposobljenost za organiziranje in vodenje oddelka ali skupine, • usposobljenost za komuniciranje z interesnimi skupinami (dobavitelji, kupci, konkurenco, strokovnjaki z različnih področij, politiki itd.), • usposobljenost za svetovalno delo. 	<ul style="list-style-type: none"> • ability to understand and solve concrete energy problems, • sovereignty and autonomy in the field of professional work, • ability to provide counseling work and the ability to transfer knowledge to others, • ability to work in a team, • development of professional skills in the field of technologies and systems, • ability to organize and lead a department or group, • ability to communicate with stakeholders (suppliers, customers, competition, experts in various fields, policies, etc.), • competence for consulting work.
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Predvideni študijski rezultati:

Študent/študentka:

- zna uporabljati pridobljeno znanje za reševanje energijskih problemov,
- zna poiskati specialno strokovno literaturo in jo uporabiti v tehnoloških procesih,
- zna uporabljati pridobljeno teoretično znanje v energetiki,
- vidi medsebojne povezave v enostavnih in sestavljenih energijskih procesih,
- zna kritično ovrednotiti šibke točke v procesih,
- vidi povezave s sorodnimi učnimi predmeti.

Intended learning outcomes:

Students:

- know how to use the acquired knowledge to solve energy problems,
- know how to find special professional literature and use it in technological processes,
- know how to use the acquired theoretical knowledge in energy field,
- see interconnections in simple and complex energy processes,
- is able to critically evaluate weak points in processes,
- see connections to related subjects.

Metode poučevanja in učenja:

- *predavanja* z aktivno udeležbo študentov (razlaga, diskusija, vprašanja, primeri, reševanje problemov),
- *avditorne vaje*: reševanje problemov, študije primerov, kritično presojanje, diskusija, refleksija izkušenj, vrednotenje, projektno delo, timsko delo,
- *seminar*: priprava, predstavitev in uspešen zagovor projektne/raziskovalne naloge, (reševanje problemov, študije

Learning and teaching methods:

- *lectures* with active student participation (explanation, discussion, questions, examples, problem solving),
- *tutorial*: problem solving, case studies, methods of critical thinking, discussion, reflection of experience, evaluation, project work, team work,
- *seminar tutorial*: presentation and defence of project/research work (problem solving, studies, critical

primera, kritično presojanje, diskusija, refleksija izkušenj, vrednotenje, projektno delo, timsko delo).	thinking, discussion, reflection of experience, evaluation, project work, team work).
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Načini ocenjevanja:	Delež (v %) Weight (in %)	Assessment:
Načini: <ul style="list-style-type: none"> • pisni izpit • ustni izpit • projektno seminarsko delo <p>Ocenjevalna lestvica: ECTS.</p>	<p>30 %</p> <p>40 %</p> <p>30 %</p>	Types: <ul style="list-style-type: none"> • written exam • oral examination • project seminar <p>Grading scheme: ECTS.</p>