

## UČNI NAČRT PREDMETA / COURSE SYLLABUS

|                      |                                   |
|----------------------|-----------------------------------|
| <b>Predmet:</b>      | OKOLJE IN ENERGETSKI VIRI         |
| <b>Course title:</b> | ENVIRONMENT AND ENERGETIC SOURCES |

| Študijski program in stopnja<br>Study programme and level               | Študijska smer<br>Study field | Letnik<br>Academic year             | Semester<br>Semester |
|---|-------------------------------|-------------------------------------|----------------------|
| Varstvo okolja in ekotehnologije,<br>2. stopnja                         | Modul:<br>Ekotehnologije      | 1. in 2.                            | /                    |
| Environmental Protection and<br>Eco-technologies, 2 <sup>nd</sup> level | Module:<br>Ecotechnologies    | 1 <sup>st</sup> and 2 <sup>nd</sup> | /                    |

**Vrsta predmeta / Course type** Modularni predmet / Modular course

**Univerzitetna koda predmeta / University course code:** OEV

| Predavanja<br>Lectures | Sem. vaje<br>Tutorial | Lab. vaje<br>Laboratory work | Teren. vaje<br>Field work | Samost. delo<br>Individ. work | ECTS |
|------------------------|-----------------------|------------------------------|---------------------------|-------------------------------|------|
| 20                     | 20                    | /                            | /                         | 80                            | 4    |

**Nosilec predmeta / Lecturer:** Prof. dr. Željko Vukelič

|                                |                               |                         |
|--------------------------------|-------------------------------|-------------------------|
| <b>Jeziki /<br/>Languages:</b> | <b>Predavanja / Lectures:</b> | Slovenščina / Slovenian |
|                                | <b>Vaje / Tutorial:</b>       | Slovenščina / Slovenian |

|  |                          |
|--|--------------------------|
| <b>Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:</b> | <b>Prerequisites:</b>    |
| Pogojev ni.  | No formal prerequisites. |

### Vsebina:

- ENERGETSKI POTENCIAL OKOLJA
- AKTIVNI ENERGETSKI VIRI
- GORIVA
- OBNOVLJIVI VIRI
- NEIZKORISTLJIVI VIRI
- ZAKLJUČEN EKOLOŠKO
- ENERGETSKI KROG
- OBČUTLJIVOST OKOLJA NA IZRABO ENERGETSKIH VIROV, EMISIJE IN IMISIJE
- NAPOVEDI PORABE VIROV
- OHRANJANJE IN NADOMEŠČANJE VIROV
- VAROVANJE OKOLJA PRI ENERGETSKI PRESKRBI PREBIVALSTVA

### Poglavitne teme:

- PREHOD NA OBNOVLJIVE VIRE

### Content (Syllabus outline):

- energetic potential of environment
- active energetic resources
- fuels
- renewable resources
- unexploited resources
- closed organic
- energy cycle
- environmental sensitivity to energy use, emission and immission
- forecasts of resource consumption
- preserving and replacing resources
- environmental protection with providing energy for public

### Main topics:

- transition to renewable sources

**Temeljna literatura in viri / Textbooks:**

**Obvezna / Required:**

1. Volker Quaschnig, Renewable Energy and Climate Change, 2010
2. BP Statistical Review of World Energy
3. Hal Marcovitz, Can renewable energy replace fossil fuels?, 2011
4. Energetska bilanca Republike Slovenije 2015
5. Peter Novak, Sašo Medved, Energija in okolje, 2000
6. Energetska proizvodnja, Fakulteta za strojništvo, 2011
7. Katedra za mehatroniko, Proizvodnja in shranjevanje vodika, 2012
8. Ibon Galarraga, Handbook of Sustainable Energy, 2011
9. Željko Vukelić, Izraba geotermalne energije I,II, predavanja UL NTF, 2010
10. Željko Vukelić, Globinsko vrtnanje I,II, predavanja UL NTF, 2010
11. Bogdan Makovšek, pridobivanje premoga in fosilnih goriv, 2010
12. Raba energije, Fakulteta za strojništvo, 2010

**Priporočena / Recommended:**

1. Volker Quaschnig, Renewable Energy and Climate Change, 2010
2. BP Statistical Review of World Energy

**Cilji in kompetence:****Predmetno specifični cilji in kompetence:**

V danem okolju zna študent poiskati in analizirati obstoječe in potencialne vire energije. Zna oceniti občutljivost njihovega izkoriščanja in porabe ter določiti kakšno obremenitev bodo povzročali v okolju. Zna oceniti porabo virov za določene energetske namene. Usposobi se za zamenjavo klasičnih z alternativnimi viri, zna ohranjati energetski potencial in ga ekonomsko plasirati na energetske tržišče. Pozna kroženje energije v naravi in to upošteva pri varovanju okolja in energetski preskrbi prebivalstva.

**Splošne kompetence:**

Usposobi se za zamenjavo klasičnih z alternativnimi viri, zna ohranjati energetski potencial in ga ekonomsko plasirati na energetske tržišče.

**Objectives and competences:****Specific competences:**

Student can find and analyze existing and potential resources of energy in any given environment. He can assess the sensitivity of their exploitation and consumption and determine the stress it will cause to the environment. He can assess the use of resources for intended energy purpose. He will qualify for exchanging classical for alternative resources; he will know how to preserve energetic potential and how to economically put it on the economical market. He will know the cycle of energy in nature and he will take it into account when protecting the environment and energetic supply of public.

**General competences:**

He will qualify for exchanging classical for alternative resources; he will know how to preserve energetic potential and how to economically put it on the economical market.

**Predvideni študijski rezultati:****Znanje in razumevanje:**

Študent bo ob zaključku predmeta sposoben:  
Študent bo ob zaključku tega predmeta sposoben oceniti energetski potencial svojega okolja, znal bo poiskati nadomestne vire in jih kombinirati s klasičnimi, poznal bo porabo energije pri prebivalstvu in industriji ter znal oceniti njen vpliv na okolje, uporabiti znanja za varovanje okolje in preprečevanje nedopustnih emisij ter nesmotrne porabe energije.

**Intended learning outcomes:****Knowledge and understanding:**

At the end of the subject, student will be able:  
By the end of the lectures, the student will be capable of assessing the energetic potential of his environment, he will know where to find alternative resources and how to combine them with classical; he will know the consumption of energy by public and industry and he will know how to assess its impact on the environment, how to use his knowledge of protecting the environment and the

**Prenosljive/ključne spretnosti in drugi atributi:**  
 Študent se bo naučil uporabe literature, priročnikov in tabel za pridobivanje podatkov, znal bo izmeriti in izračunati vrednosti po določenih postopkih, sposoben bo analizirati vplive in jih sintetizirati v končnih odločitvah.

prevention of inadmissible emissions and thoughtless consumption of energy.  
**Transferable/key skills and other attributes:**  
 Student will learn how to use literature, manuals and chart data acquisition, he will know how to measure and calculate value by established procedures and he will be able to analyze impacts and synthesize them in final decisions.

**Metode poučevanja in učenja:**

**Oblike dela:**  
 - Frontalni način predavanja,  
 - Prikaz z vizualnimi sredstvi,  
 - Delo v skupinah pri semin. nalogah.

**Metode dela:**  
 Predavanja, izdelava seminarjev in diskusija

**Learning and teaching methods:**

**Forms of teaching:**  
 - frontal lecture  
 - visual display  
 - teamwork on assignments

**Teaching methods:**  
 Lectures, seminars and discussions

| <b>Načini ocenjevanja:</b>  | Delež (v %) /<br>Weight (in %) | <b>Assessment:</b>   |
|---|--------------------------------|--|
| <p>Pogoj za pristop k izpitu: ...</p> <p>Končna ocena pri predmetu je sestavljena iz ...</p> <p>Ocenjevalna lestvica:</p> <ul style="list-style-type: none"> <li>▪ zadostno 6: 60–67 %</li> <li>▪ dobro 7: 68–75 %</li> <li>▪ prav dobro 8: 76–83 %</li> <li>▪ prav dobro 9: 84–90 %</li> <li>▪ odlično 10: 91–100 %</li> </ul> |                                | <p>A prerequisite for access to the exam: ...</p> <p>Final evaluation consists of ...</p> <p>Grading scale:</p> <ul style="list-style-type: none"> <li>▪ Sufficient D (6): 60–67%</li> <li>▪ Good C (7): 68–75%</li> <li>▪ Very good B (8): 76–83%</li> <li>▪ Very good B+ (9): 84–90%</li> <li>▪ Excellent A (10): 91–100%</li> </ul> |

**Materialni pogoji za izvedbo predmeta :**

- Predavalnica z mutimedijsko opremo,

**Material conditions for subject realization:**

- Lecture room with multimedia equipment

**Obveznosti študentov:**

(pisni, ustni izpit, naloge, projekti):  
 - Vsaj 80 % prisotnost na predavanjih  
 - 100 % prisotnost na vajah,  
 - Izdelana in pozitivno ocenjena seminarska naloga

**Student's commitments:**

(written, oral examination, coursework, projects):  
 - at least 80 % class attendance  
 - 100 % fieldwork attendance  
 - Finished and positively graded assignment (term paper)

## Reference nosilca predmeta:

### Pedagoško delo:

- VUKELIČ, Željko, ŠPORIN, Jurij. *Rešene naloge iz vrtalne tehnike in projekt vrtine*. 1. izd. Ljubljana: Naravoslovnotehniška fakulteta, Oddelek za geotehnologijo in rudarstvo, 2007.
- BOMBAČ, Andrej, VUKELIČ, Željko, ANŽELI, Iztok (urednik). *Naloge in rešitve izbranih poglavij termodinamike in mehanike tekočin*. 1. izd. Ljubljana: Naravoslovnotehniška fakulteta, Oddelek za geotehnologijo in rudarstvo, 2002

### Znanstveno-raziskovalno delo:

1. ŠPORIN, Jurij, MRVAR, Primož, PETRIČ, Mitja, VIŽINTIN, Goran, VUKELIČ, Željko. The characterization of wear in roller cone drill bit by rock material - sandstone. *Journal of petroleum science & engineering*. [Print ed.]. 2019,
2. VUKELIČ, Željko, ŠPORIN, Jurij. Determination of Save excavation criteria in Velenje Coal Mine. *Minerals*, 2024
3. VUKELIČ, Željko, ŠPORIN, Jurij. Groundwater potential for the utilisation of shallow geothermal energy from a closed coal mine. *Water*. 2024
4. VUKELIČ, Željko, DERVARIČ, Evgen, ŠPORIN, Jurij, VIŽINTIN, Goran. The development of dewatering predictions of the Velenje coalmine. *Energies*. 2016
5. JANC, Blaž, VUKELIČ, Željko. Mud-pump pressure in geothermal wells = Tlak izplačne črpalke pri geotermalnih vrtinah. *Acta geotechnica Slovenica*. 2020

### Strokovno delo in izbrane strokovne publikacije:

- VUKELIČ, Željko. Zmanjšajmo stroške z izrabo plitve geotermalne energije. *IZS.novo : glasilo Inženirske zbornice Slovenije*. 2021,
- VUKELIČ, Željko. The drilling and casing program for CO2 storage = Načrtovanje in izvedba globokih vrtin pri skladiščenju CO2. *RMZ - Materials and geoenvironment : periodical for mining, metallurgy and geology*. 2010,

### Priznanja in nagrade:

- Redni član Balkan Mine Academy of Mining Science

## Lecturer's references:

### Pedagogic activities:

- VUKELIČ, Željko, ŠPORIN, Jurij. *Rešene naloge iz vrtalne tehnike in projekt vrtine*. 1. izd. Ljubljana: Naravoslovnotehniška fakulteta, Oddelek za geotehnologijo in rudarstvo, 2007.
- BOMBAČ, Andrej, VUKELIČ, Željko, ANŽELI, Iztok (urednik). *Naloge in rešitve izbranih poglavij termodinamike in mehanike tekočin*. 1. izd. Ljubljana: Naravoslovnotehniška fakulteta, Oddelek za geotehnologijo in rudarstvo, 2002

### Scientific and research work:

1. ŠPORIN, Jurij, MRVAR, Primož, PETRIČ, Mitja, VIŽINTIN, Goran, VUKELIČ, Željko. The characterization of wear in roller cone drill bit by rock material - sandstone. *Journal of petroleum science & engineering*. [Print ed.]. 2019,
2. VUKELIČ, Željko, ŠPORIN, Jurij. Determination of Save excavation criteria in Velenje Coal Mine. *Minerals*, 2024
3. VUKELIČ, Željko, ŠPORIN, Jurij. Groundwater potential for the utilisation of shallow geothermal energy from a closed coal mine. *Water*. 2024
4. VUKELIČ, Željko, DERVARIČ, Evgen, ŠPORIN, Jurij, VIŽINTIN, Goran. The development of dewatering predictions of the Velenje coalmine. *Energies*. 2016
5. JANC, Blaž, VUKELIČ, Željko. Mud-pump pressure in geothermal wells = Tlak izplačne črpalke pri geotermalnih vrtinah. *Acta geotechnica Slovenica*. 2020

### Professional work and selected professional publications:

- VUKELIČ, Željko. Zmanjšajmo stroške z izrabo plitve geotermalne energije. *IZS.novo : glasilo Inženirske zbornice Slovenije*. 2021,
- VUKELIČ, Željko. The drilling and casing program for CO2 storage = Načrtovanje in izvedba globokih vrtin pri skladiščenju CO2. *RMZ - Materials and geoenvironment : periodical for mining, metallurgy and geology*. 2010,

### Awards:

- Full member Balkan Mine Academy of Mining Science

### Izbrani znanstveni članki / Selected scientific papers:

1. ŠPORIN, Jurij, MRVAR, Primož, PETRIČ, Mitja, VIŽINTIN, Goran, VUKELIČ, Željko. The characterization of wear in roller cone drill bit by rock material - sandstone. *Journal of petroleum science & engineering*. [Print ed.]. 2019,
2. VUKELIČ, Željko, ŠPORIN, Jurij. Groundwater potential for the utilisation of shallow geothermal energy from a closed coal mine. *Water*. 2024