

**UČNI NAČRT PREDMETA / COURSE SYLLABUS**

**Predmet:** OSNOVE ASTRONOMIJE Z DIDAKTIKO  
**Course title:** Fundamentals of Astronomy with Didactics

**Vrsta predmeta / Course type**

D - Skupni izbirni predmet

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

/

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
25	5	30		0	120	6

**Nosilec predmeta / Lecturer:**

doc. dr. Barbara Rovšek

**Jeziki /**

**Predavanja / Lectures:** slovenščina, angleščina

**Languages:**

**Vaje / Tutorial:** slovenščina, angleščina

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

1. Zaradi načina in narave dela pri predmetu je prisotnost in aktivna udeležba pri vseh kontaktnih oblikah študija obvezna.
2. Pisni izpit lahko opravlja, kdor je uspešno izpolnil vse ostale obveznosti pri predmetu (nastop, seminar, domače naloge).

**Prerequisites:**

1. Attendance and active participation of the students at all contact hours is compulsory due to the nature of the subject.
2. The student may attend the written exam after successfully completed (with the passing grade) demonstration lessons, seminar and homework assignments.

**Vsebina:**

1. Predmet obravnava osnovne astronomske vsebine in specifične metode poučevanja astronomskih vsebin v učnih načrtih naravoslovnih predmetov in geografije v osnovni šoli.
2. Študentje se seznanijo z deli učnih načrtov, ki vsebujejo astronomske vsebine. Spoznajo načine postopnega izgrajevanja astronomskih modelov (npr. Osončja), ki jim na ustreznih stopnjah dodajamo nove podrobnosti (npr. gravitacijski zakon).
3. Seznanijo se s kognitivnimi problemi, ki jih imajo učenci z razumevanjem različnih konceptov s tega področja, z načini razlage, modeli in opazovalnimi poskusi, izvajanimi pri pouku.
4. Metode poučevanja so razširjene tudi na tematike obravnavane na poklicnih šolah.
5. Pri obravnavi poudarimo povezovanje predavanj, opazovanj, IKT ter preverjanja in ocenjevanja znanja iz astronomije.
6. Sestavni del predmeta so hospitacije,

**Content (Syllabus outline):**

1. The course teaches basic astronomical topics together with the teaching methods, with a focus on astronomical topics that can be found in the curricula for science subjects and geography in primary school.
2. Students are introduced to parts of the curriculum that contain astronomical content. They learn about the step-by-step construction of astronomical models (e.g. the solar system), to which new details (e.g. the law of gravity) are added in appropriate stages.
3. They become familiar with the cognitive problems that students have in understanding the different concepts in this area, with the modes of interpretation, models and observational experiments that are carried out during the lessons.
4. Teaching methods appropriate for vocational schools are also discussed.
5. In the course of the discussion we emphasize the connection between lectures,

nastop (en), ki vključuje praktično delo v razredu.

7. Sestavni del predmeta je delo s teleskopom, tudi opazovanja.

8. Študent spozna konkretne vsebine in problematiko poučevanja astronomskih vsebin: gibanje Zemlje in Lune, navidezno gibanje Sonca, orientacija na nebu in dnevno gibanje zvezd, vidnost ozvezdij skozi vse leto, uporaba vrtljive zvezdne karte, priprava (vsebinska in organizacija) opazovanj za cel oddelek, dodatno delo z nadarjenimi.

observations, ICTs and the examination and assessment of knowledge in astronomy.

6. Attendance of in-service teacher lessons, demonstration lessons, and teaching practice are integral parts of the subject.

7. Work with the telescope, including observations, is an integral part of the course.

8. The students learn the concrete contents and problems of teaching astronomical contents: Motion of the Earth and Moon, apparent motion of the Sun, orientation in the sky and daily motion of the stars, visibility of the constellations throughout the year, use of a rotating star chart, preparation of observations (in terms of content and organization) for the whole class, additional work with the gifted students.

### Temeljni literatura in viri / Readings:

Obvezna literatura:

1. Raziskujmo ozvezdja, B. Kambič, Ljubljana : Cambio, 2007.
2. Moj prvi zvezdni atlas, B. Kambič, Ljubljana : Cambio, 2018.
3. Praktična astronomija, A. Guštin (v nastajanju).
4. Astronomija v OŠ, A. Guštin (v nastajanju).

Dodatna literatura:

1. Vrtljiva zvezdna karta, B. Kambič, Ljubljana : Spika, 2020.
2. Učbeniki, delovni zvezki in priročniki za učitelje za Spoznavanje okolja v 1. triadi, Naravoslovje in tehniko v 4. in 5. razredu, Geografijo v razredu ter za Fiziko v 8. in 9. razredu OŠ
3. Učni načrti za Spoznavanje okolja v 1. triadi, Naravoslovje in tehniko v 4. in 5. razredu, Geografijo v 6. razredu ter za Fiziko v 8. in 9. razredu OŠ
4. Izbrane vsebine iz revij Spika, Fizika v šoli (Zavod za šolstvo Republike Slovenije), Presek (DMFA), Naravoslovna solnica (Pedagoška fakulteta), Physics education in European Journal of Physics (oboje Institute of Physics), The Physics Teacher (American Association of Physics Teachers) in druge.
5. Izbrane vsebine s spletne strani Portal v vesolje in povezav s te strani.
6. J. Strnad, O poučevanju fizike, DMFA (2007).

### Cilji in kompetence:

Splošne:

1. sposobnost komuniciranja, sodelovalno/timsko delo;
2. sintetično analitično, ustvarjalno mišljenje ter reševanje problemov;
3. fleksibilna uporaba znanja v praksi;
4. avtonomnost, (samo) kritičnost, (samo) refleksivnost, prizadevanje za kakovost;
5. splošna razgledanost, sposobnost komuniciranja s strokovnjaki drugih strokovnih in znanstvenih področij;
6. iniciativnost/ ambicioznost, vrednota osebnega stalnega strokovnega napredovanja
7. informacijska pismenost;
8. komuniciranje v tujem jeziku.

Predmetno specifične:

### Objectives and competences:

General competences:

1. communicative competence, collaborative/team work;
2. synthetic, analytical, and creative thinking and problem solving;
3. flexible application of knowledge in the practice;
4. autonomy, (self)criticality, (self)reflection, (self)evaluation and quality endeavour;
5. comprehensive background knowledge, abilities to communicate with professional from other professional and scientific areas;
6. showing initiative/ambition, value of constant personal development and professional training;
7. information and communication literacy;

1. razvijanje sposobnosti naravoslovnega razmišljanja;
2. obvladovanje različnih specifičnih učnih strategij;
3. priprava, izvedba in interpretacija demonstracijskih poskusov;
4. obvladovanje osnovnih merskih metod in njih uporaba pri pouku in pri laboratorijskih vajah učencev;
5. prikaz in interpretacij eksperimentalnih podatkov in njihova povezava s teorijo, ocena natančnosti izmerjenih količin;
6. organiziranje in vodenje projektnega, skupinskega, terenskega in laboratorijskega dela;
7. uporaba računalnika pri delu;
8. usposobljenost za varno opazovanje, sposobnost ocene nevarnosti dela, poznavanje varnostnih predpisov in ravnanje v skladu z njimi.

8. foreign language communication competence.
- Subject specific competences:
1. developing the ability of scientific reasoning;
  2. mastering various specific teaching strategies;
  3. preparation, execution and interpretation of demonstration experiments;
  4. mastering fundamental measurement methods and application of these during classes and laboratory work;
  5. presenting and interpreting experimental data, relating data and theory, and assessing precision of the measured quantities;
  6. organizing and managing project, group, field and laboratory work;
  7. implementing computer in experimental work;
  8. ability to manage safe observations, knowing safety hazards, understanding and acting in accordance with safety regulations.

#### **Predvideni študijski rezultati:**

Znanje in razumevanje:

1. Študent pozna in razume kognitivne težave učencev pri obravnavanih vsebinah iz astronomije. Ima strokovno znanje o teh vsebinah ter tudi didaktično znanje, ki obsega znanje o načinih obravnave teh vsebin.
2. Študent ima ustrezno znanje in razumevanje opisanega področja in suvereno izbira učne metode, učna sredstva, demonstracijske poskuse in modele. Sestavlja korektne naloge za pisno preverjanje znanja in zastavlja korektna vprašanja pri ustnem preverjanju znanja učencev o astronomiji.

Uporaba:

1. Študent pozna didaktiko opisanih vsebin, kar je neposredno uporabno pri poučevanju astronomije v vseh razredih osnovne šole in v nekaterih poklicnih šolah.

Refleksija:

1. Študent se zaveda pomena opazovanja in uporabe modelov pri pouku astronomije, zaveda se uporabnosti in primernosti različnih učnih metod v različnih okoliščinah.
2. Študent pozna in se zaveda pomena, ki ga ima astronomija za razvoj naravoslovnega načina razmišljanja, splošno naravoslovno razgledanost posameznika in sodobno družbo.

Prenosljive spretnosti:

1. Študent je seznanjen s povezavami z drugimi področji in je sposoben metode, ki se

#### **Intended learning outcomes:**

Knowledge and understanding:

1. The student knows and understands the cognitive difficulties of the students in the discussed contents in astronomy. He has expertise in these topics, as well as didactic knowledge that includes knowledge of how to deal with them.
2. The student has adequate knowledge and understanding of the described field and is able to make a sovereign choice of teaching methods, teaching aids, demonstration experiments and models. The student assigns fair assignments for written assessment and asks fair questions in oral examination of students' knowledge of astronomy.

Application:

1. The student is familiar with the didactics of the described contents, which is directly useful in teaching astronomy in all elementary school grades and in some vocational schools.

Reflection:

1. The student is aware of the importance of astronomical observations and using models in the teaching astronomy, and is aware of the usefulness and appropriateness of different teaching methods in different circumstances.
2. The student is familiar and aware of the importance of astronomy for the development of the scientific way of thinking, the general scientific literacy of the individual and the modern society.

Transferable skills:

1. The student is familiar with the links with

uporabljajo pri poučevanju astronomije, prenesti tudi na druga področja poučevanja.

other fields and is able to transfer the methods used in teaching astronomy to other areas of teaching.

**Metode poučevanja in učenja:**

1. Predavanja.
2. Laboratorijsko delo.
3. Terensko delo (astronomsko opazovanje).
4. Hospitacije in nastop.
5. Individualno delo.
6. Pri predavanjih, laboratorijskih vajah in terenskemu delu sodeluje laborant.

**Learning and teaching methods:**

1. Lectures.
2. Laboratory.
3. Field work (astronomical observations).
4. Attendance of in-service teacher lessons and demonstration lessons.
5. Individual work.
6. During lectures, laboratory classes and field work a technician or a demonstrator is present.

**Načini ocenjevanja:****Delež (v %) /  
Weight (in %)****Assessment:**

Pisni izpit.	30	Written exam.
Predstavitve seminarja.	20	Seminar presentation.
Nastop (priprave na nastop 10 % + nastop 10 %).	20	Demonstration lessons (preparations 10% and lesson 10%).
Laboratorijske vaje in domače naloge (oceno se delno pridobi po metodi vrstniškega ocenjevanja).	30	Laboratory and homework (peer assessment partially).

/

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

doc. dr. Barbara Rovšek:

1. ROVŠEK, Barbara. Observe your shadow. The Physics teacher. 2016, vol. 54, no. 4, str. 223-226, ilustr., tabele. ISSN 0031-921X. [COBISS.SI-ID 11005513]
2. ROVŠEK, Barbara, GUŠTIN, Andrej. Model of solar system : Kepler's third law and elongation of Venus at science competition. V: M'CLOUGHLIN, Eilish (ur.), KAMPEN, Paul van (ur.). Bridging research and practice in physics teaching and learning : program and book of abstracts. Dublin: Dublin City University, 2017. Str. 58-59. [COBISS.SI-ID 11617865]
3. ROVŠEK, Barbara, GUŠTIN, Andrej. Two activities with a simple model of the solar system : discovering Kepler's 3rd law and investigating apparent motion of Venus. Physics Education. vol. 53, no. 1, 12 str. (pdf), ilustr., tabele, graf. prikazi. ISSN 0031-9120. <http://iopscience.iop.org/article/10.1088/1361-6552/aa95d6/pdf>, DOI: 10.1088/1361-6552/aa95d6. [COBISS.SI-ID 11849033]
4. ROVŠEK, Barbara. Assessing learning outcomes from experiments in a science competition. European journal of physics. 2017, vol. 38, no. 3, 15 str. (pdf), ilustr. ISSN 1361-6404. <http://iopscience.iop.org/article/10.1088/1361-6404/aa5560>, <http://pefprints.pef.uni-lj.si/id/eprint/4376>, DOI: 10.1088/1361-6404/aa5560/meta. [COBISS.SI-ID 11461705]
5. ROVŠEK, Barbara, GUŠTIN, Andrej. Tretji Keplerjev zakon in elongacija Venere. Fizika v šoli. 2017, letn. 22, št. 2, str. 19-25, ilustr. ISSN 1318-6388. [COBISS.SI-ID 11824713]