



**UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION**

<b>Predmet:</b>	Didaktika astronomije
<b>Subject Title:</b>	Didactics of Astronomy

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Enopredmetna izobraževalna fizika Single major Educational Physics		1	1

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Labor work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30			15	30	75	5

Nosilec predmeta / Lecturer:

<b>Jeziki / Languages:</b>	<b>Predavanja / Lecture:</b>	Slovenski/slovene
	<b>Vaje / Tutorial:</b>	Slovenski/slovene

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

Izkušnje z izvajanjem laboratorijskih in terenskih vaj, osnovna znanja iz mehanike in optike, osnove strokovnega pisanja

**Prerequisites:**

Experiences in laboratory exercises and terrain work, basic knowledge of mechanics and optics, basics of scientific writing

**Vsebina:**

PR:  
Pregled zgodovinskega razvoja astronomije. (4)

Pregled astronomskih objektov, pojmov in procesov: (6)

- osnovni objekti v astronomiji (obravnava z večanjem oddaljenosti od Zemlje: Luna, Sonce, Sončev sistem, Galaksija, Lokalna jata...)
- velikostne predstave (razmerja velikosti objektov, razmerja oddaljenosti)
- povezave med objekti (komet – meteorski roj...)
- gibanja objektov v vesolju in posledice (dan-noč, letni časi, mrki...)
- sodobne raziskave v astronomiji in možnosti za prenos informacij v pouk v osnovni in srednji šoli

Opazovanja v astronomiji: (10)

- orientacija na nebu, koordinatni sistemi, orientacija in razlaga v preteklosti
- astronomski pripomočki

zvezdna karta, astronomski atlas, efemeride; računalniški programi, IKT v astronomiji, internet;

**Content (Syllabus outline):**

Lectures:  
Overview of the historical development of astronomy. (4)

Overview of astronomical objects, phenomena and processes: (6)

- Basic objects in astronomy (teaching in sequence of increasing distance from the Earth: The Moon, Sun, Solar system, Galaxy, local cluster ...)
- Dimensions conceptions (ratio of the size of objects, ratio of distances)
- Links between objects (comet - meteor showers ...)
- Movement of objects in space and consequences (day-night, seasons, eclipses ...)
- Modern research in astronomy and the potential for transmission of information in teaching in elementary and secondary school

Observations in astronomy: (10)

- Orientation in the sky, coordinate systems, orientation and explanations in the past
- Astronomical Accessories

star charts, astronomical atlas, ephemerides; computer programs, ICT in astronomy, internet;

optični pripomočki: projekcije, binokularji, teleskopi; ostali pripomočki: sekstant, laser...

- astronomska opazovanja s prostimi očmi:  
Luna: mene, vzhajanje in zahajanje, mrki; Sonce: vzhajanje in zahajanje, mrki; meteorji; planeti; svetlobna onesnaženost; priprava, organizacija in opremljenost za astronomska opazovanja  
- astronomska opazovanja z optičnimi pripomočki: postavitve, kolimiranje, umerjanje, napajanje teleskopov, Go-To funkcija; opazovanja objektov v Osončju, Messierjev katalog, NGC in drugi katalogi; fotografija in video v astronomiji, obdelava z računalnikom, filtri, kamere; spektroskopija, fotometrija, druge metode; večji teleskopi, nadatmosferski teleskopi, radijski teleskopi, južno nebo

Astronomija v izobraževalni vertikali: (10)

- pregled astronomskih vsebin v kurikulumu rednih predmetov po izobraževalnih stopnjah od predšolske vzgoje do mature; druge možnosti: izbirni predmeti, raziskovalno in projektno delo, dnevi dejavnosti, tabori, društva in amaterska ter profesionalna astronomija  
- preverjanje in ocenjevanje pri poučevanju astronomskih vsebin  
- razvoj naravoslovnih kompetenc in spretnosti pri poučevanju astronomskih vsebin  
- nivojsko zasnovano poučevanje astronomskih vsebin  
(predšolska vzgoja, 1. triletje, 4. in 5. razred, predmet naravoslovje, fizika 8. in 9. razred

LV:

- IKT, astronomski multimedijski pripomočki, astronomija in internet  
- določevanje dimenzij in oddaljenosti objektov v preteklosti in danes,  
- uporaba fizikalnih zakonov v astronomiji: mehanika nebesnih teles, gravitacijski zakon, Newtonovi in Keplerjevi zakoni, ohranitvene količine, jedrske reakcije, sevanje, Stefanov in Vienov zakon, Hubbleov zakon...  
- orientacija in koordinatni sistemi  
- uporaba astronomskih pripomočkov  
- izvedba dveh astronomskih učnih ur za različni izobraževalni stopnji)

TV:

Izvesti osnovna astronomska opazovanja s praktično uporabo astronomskih pripomočkov:  
- organizacija astronomskih opazovanj v šoli  
- opazovanje Lune in Sonca  
- opazovanje planetov Osončja  
- izvedba osnovnih opazovanj s prostimi očmi  
- izvedba aktivnosti z uporabo astronomskih pripomočkov,  
- opazovanje svetlobne onesnaženosti na izbranem področju  
- izvedba opazovanj z optičnimi pripomočki izbranih

Optical devices: projections, binoculars, telescopes; other tools: sextant, laser...

- Astronomical observations with naked-eyes:  
Moon: phases, rising and setting, eclipses; Sun: rising and setting, eclipses, meteors, planets, light pollution, preparation, organization and equipment for astronomical observation  
- Astronomical observation by optical devices: layout, collimation, calibration, power supply of telescopes, Go-To function, observation of objects in the solar system, Messier catalogue, NGC and other catalogues, photography and video in astronomy, processing with a computer, filters, cameras, spectroscopy, photometry, other methods ; larger telescopes, above-atmospheric telescopes, radio telescopes, Southern Sky

Astronomy in education vertical: (10)

- Review of astronomical content in the curriculum of regular subjects in education levels from pre-school till end of secondary school level, other possibilities: elective subjects, research and project work, activity days, camps, clubs and amateur and professional astronomy  
- Testing and evaluation in teaching astronomy content  
- Development of science competences and skills in teaching astronomy content  
- Different level based teaching astronomical content (Kindergarten, 1st three-year, 4th and 5th grade, the subject of science, physics in 8th and 9th grade

LW:

- ICT, astronomical multimedia devices, astronomy and internet  
- Determination of size and distance of objects in the past and today,  
- application of physical laws in astronomy mechanics of astronomical objects, the gravitational law, Newton's and Kepler's laws, conservation of physics quantities, nuclear reactions, radiation, Stefan's and Wien's law, Hubble's law ...  
- Orientation and coordinate systems  
- The use of astronomical tools  
- implementation of two astronomical lessons for the different educational level

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Perform basic astronomical observation with practical use of astronomical tools:  
- Organization of astronomical observations in school  
- Observation of the Moon and the Sun  
- Observation of the solar system planets  
- Implementation of basic naked-eye observations  
- The execution of activities with the use of astronomical accessories and tools  
- Observation of light pollution in the selected area  
- Implementation of an optical observations of selected astronomical deep-space objects

astronomskih objektov globokega vesolja  
- pri opazovanju izbranega astronomskega objekta posneti astronomsko fotografijo in/ali video, računalniška obdelava  
- opazovanje meteorskega roja

Izvedeno eno sistematično astronomsko opazovanje skozi daljši čas (Lunine mene, aktivnost Sonca, višina objekta v kulminaciji, analema, lune planetov, Venerine mene, Jupitrova rdeča pega...)

Projektna naloga:  
Samostojno delo: organizacija in sistematična izvedba kvantitativnih opazovanj izbranega astronomskega objekta na dogovorjen način, priprava poročila.

- record astronomical photography and / or video of selected astronomical object, computer processing  
- Observation of meteor shower

Implementation of a long-time-period systematical astronomical observation (moon, sun activity, the culmination of astronomical objects, analema, moons of planets, Venus, Jupiter Red Spot ...)

Project Work:  
Independent work: organization and systematic execution of quantitative astronomical observations of selected astronomical object in the prescribed manner, the preparation of report.

### Temeljni literatura in viri / Textbooks:

15. Zwitter Tomaž, Pot skozi vesolje, Modrijan, Ljubljana, 2002
16. Avsec France, Prosen Marijan, Astronomija, DMFA, Ljubljana, 2006
17. Južnič Stanislav, Prosen Marijan, Astronomija na Slovenskem in slovenski astronomi na tujem, Didakta, Radovljica, 2008
18. Strnad Janez, Mala zgodovina vesolja, DMFA, Ljubljana
19. Chisolm Joanna in dr., Vesolje - velika ilustrirana enciklopedija, Mladinska knjiga, Ljubljana, 2008
20. Članki v revijah OMF, Presek, Spika, Weltraum und Sterne, Kmica

### Cilji:

Študenti osvojijo znanja s področja didaktike astronomije za prenos znanj na nivo, ki je primeren za poučevanje v osnovni in srednji šoli.

### Objectives:

Students acquire knowledge in the field of didactics of astronomy for the transfer of knowledge and skills to a level suitable for teaching in primary and secondary school

### Predvideni študijski rezultati:

Znanje in razumevanje:

Poglobljeno znanje tem s področja didaktike astronomije. Poznajo osnovne astronomske objekte, zgodovinski razvoj astronomije in sodobne raziskave. Znajo samostojno organizirati in varno izvesti različna astronomska opazovanja ter o njih poročati. Usposobijo se za pripravo pouka astronomskih vsebin na različnih izobraževalnih stopnjah. Znajo uporabiti računalnik kot podporo pri poučevanju. Poleg astronomskih znanj znajo razvijati naravoslovne kompetence in spretnosti.

Prenesljive/ključne spretnosti in drugi atributi:

Strokovna in informacijska pismenost. Podajanje znanja za različne razvojne stopnje.

### Intended learning outcomes:

Knowledge and Understanding:

Deeper knowledge in topics of didactics of astronomy. They know the basic astronomical objects, historical development of astronomy and modern research. They know how to organize independently and safely carry out various astronomical observations and report about observations. They are trained to prepare teaching of astronomical content in different educational levels. They know how to use computer as a support for teaching. In addition to astronomical knowledge and skills they can develop science competences and skills.

Transferable/Key Skills and other attributes:

Scientific and informational literacy. Knowledge communication at different development stages.

### Metode poučevanja in učenja:

Multimedijska predavanja  
Vodeno eksperimentalno delo  
Problemsko učenje  
Terensko delo

### Learning and teaching methods:

Multimedia lectures  
Guided experimental work  
Problem-based learning  
Field work

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<b>Načini ocenjevanja:</b>	Delež (v %) / Weight (in %)	<b>Assessment:</b>
a) ustni izpit b) projektna naloga c) izdelano poročilo laboratorijskih in terenskih vaj ter zagovor	a) 40 % b) 30 % c) 30 %	a) Oral exam b) Project work c) Preparing report of labor work and field work and defend it.