



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Astronomska opazovanja v šoli
Course title:	Astronomical observations in school

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Enovit magistrski študijski program druge stopnje Predmetni učitelj	/	5	Poletni Summer
Five-year master's degree program Subject Teacher	/		

Vrsta predmeta / Course type

Izbirni/Elective

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
30			15	15	30	3

Nosilec predmeta / Lecturer:

Robert Repnik

Jeziki / Predavanja / Lectures:

slovenski/Slovene

Languages: Vaje / Tutorial:

slovenski/Slovene

Pogoji za vključitev v delo oz. za opravljanje Prerequisites:

študijskih obveznosti:

Osnovna znanja iz fizike.

Basic knowledge in physics.

Vsebina:

- pregled razvoja astronomskih opazovanj, pomembnejši astronomi in njihova odkritja,
- opazovalne metode in pripomočki v preteklosti
- opazovanja s prostimi očmi, orientacija na dnevnem in nočnem nebu, ozvezdja, opazovanje Lune, Sonca in planetov, kriteriji za kvalitetna astronomska opazovanja
- koordinatni sistemi, gibanje Zemlje (rotacija, revolucija, precesija, paralaksa, pomen mesta opazovanja na zemeljskem površju) in navidezno gibanje neba
- binokularji, lečni in zrcalni teleskopi, drugi astronomski pripomočki (zvezdne karte, astronomski računalniški programi, astronomija na internetu)

Content (Syllabus outline):

- an overview of development of astronomical observations, some important astronomers and their discoveries, observing methods and instruments in the past
- observations with naked eye, orientation on the day and night sky, constellations, observations of the Moon, Sun and planets, criteria for qualitative astronomical observations
- coordinate systems, moving of Earth (rotation, revolution, precession, parallax, role of observation point on earth's surface) and apparent movement of the sky
- binoculars, refractors and reflectors, other astronomical instruments (sky maps, astronomical computer programs, astronomy on internet)

<ul style="list-style-type: none"> • gibanje Zemlje, Lune in Sonca, opazovanja teh teles in z njimi povezanih pojavov (rotacija Sonca, sončeve pege, sončev ciklus, površje Lune, lunine mene, nutacija, sončevi in lunini mrki, polarni sij, pristanki na Luni) • opazovanja planetov in drugih objektov osončja s prostimi očmi in teleskopi (gravitacijski zakon, Keplerjevi zakoni, meteorji, meteoriti, kometi, asteroidi, lune drugih planetov, misije v osončju, sevanje in lastnosti svetlobe) • opazovanje Mlečne ceste (zvezde in večzvezdja, Hertzsprung-Russelov diagram, življenje zvezd, izvenosončni planeti in planetni sistemi, razsute in kroglaste zvezdne kopice, meglice, planetarne meglice...) • katalogi opazovalnih objektov in opazovanje oddaljenih galaksij (Messierjev katalog, NGC in drugi katalogi, opazovanje Andromedine in drugih galaksij, Hubbleov zakon) • razvoj in zgradba vesolja, gibanje objektov na večji skali v vesolju (lokalna jata, jate in nadjate, mikrovalovno ozadje, veliki pok in alternativne teorije razvoja vesolja) • kratek uvod: astronomija v slovenskem izobraževalnem sistemu in slovenskem prostoru nasploh (astronomske vsebine in astronomska opazovanja v kurikulumih v vseh nivojih izobraževanja, napotki za organizacijo astronomskih opazovanj) in izdelava astronomskih opazovalnih pripomočkov • astronomija in astronomska opazovanja pri pouku fizike ter v medpredmetnih povezavah • dosedanja vloga in sodobni izzivi matematike, kemije, biologije, ekologije in računalništva v opazovanju in preučevanju vesolja • projektna naloga iz področja astronomskih opazovanj (teorija, priprava, organizacija in izvedba, dokumentiranje, priprava poročila, pisno in ustno poročanje) 	<ul style="list-style-type: none"> • movement of Earth, Moon and Sun, observation of this bodies and correlating phenomena (rotation of Sun, sunspots, Sun's cycle, Moon's surface, Moon's phases, nutation, Sun's and Moon's eclipses, aurora borealis, landings on the Moon) • observations of planets and other objects of Sun system with naked eye and telescopes (gravitation law, Kepler laws, meteors, meteorites, comets, asteroids, moons of other planets, sun system missions, radiation and properties of light) • observation of Milky way (stars and multiple stars systems, Hertzsprung-Russel diagram, life of stars, extra solar planets and planet systems, open and globular star clusters, nebulae, planetary nebulae...) • catalogues of observing objects and observations of distant galaxies (Messier catalogue, NGC and other catalogues, observing of Andromeda and other galaxies, Hubble's law) • evolution and structure of space, movement of objects in space on larger scale (local group, galaxy groups and superclusters, microwave background, big bang and alternative theories of space evolution) • short introduction: astronomy in education system in Slovenia and in Slovenia in general (astronomical subjects and astronomical observations in curriculums on all levels of education, instructions for organisation of astronomical observations) and making of astronomical observing instruments • astronomy and astronomical observations in teaching physics and in cross curricular interactions • impact and contemporary challenges of mathematics, chemistry, biology, ecology and computer science in observing and researching universe • project exercise in the field of astronomical observation (theory, preparation, organisation and execution, documenting, preparation of report, written and oral reporting)
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Temeljni literatura in viri / Readings:

<ul style="list-style-type: none"> • Sir Patrick Moore, The Amateur Astronomer (Patrick Moore's Practical Astronomy Series), Springer-Verlag London Ltd; 12Rev Ed edition (Oct 2005) • Christopher R. Kitchin, Telescopes and Techniques: An Introduction to Practical Astronomy, Springer-Verlag London Ltd; 2Rev Ed edition (Aug 2003)
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- James Muirden, Sky Watcher's Handbook: The Expert Reference Source for the Amateur Astronomer, Oxford University Press, USA (January 1, 1993)
- Salaris, Maurizio, Evolution of stars and stellar populations, Chichester : J. Wiley, cop. 2005
- T. Zwitter: Pot skozi vesolje, Modrijan, 2002
- Vrtljiva zvezdna karta nt-BROG, 2011
- učni načrti fizike in drugih predmetov s področja naravoslovja, tehnike in matematike, kjer se astronomija in astronomska opazovanja lahko pojavijo kot možnost medpredmetne povezave
- Druga astronomska periodika: Spika, Sky&Telescope, Weltraum und Sterne, Kmica ter astronomske in astrofizikalne znanstvene revije
- Zaupanja vredni spletni viri, npr.: www.nasa.gov

Cilji in kompetence:

usposobiti se za varno organizacijo individualnih ali množičnih astronomskih opazovanj različnih astronomskih objektov ali pojavov, s posebnim poudarkom na astronomskih opazovanjih znotraj slovenskega izobraževalnega sistema

Objectives and competences:

to be able for safe organisation of individual or mass astronomical observations of different astronomical objects or phenomena, in particular focused on astronomical observations in frame of Slovene educational system

Predvideni študijski rezultati:

Znanje in razumevanje:

- poznavanje razvoja astronomskih opazovanj
- razumevanje slike vesolja in glavnih fizikalnih pojavov v njem
- usposobljenost za organizacijo in izvedbo astronomskih opazovanj
- osnovno poznavanje astronomskih vsebin v slovenskem izobraževanju in ustreznih didaktičnih pristopov

Prenesljive/ključne spretnosti in drugi atributi:

- sposobnost kritičnega vrednotenja informacij
- zavedanje omejitev opazovalnih metod
- razumevanje razlike med kvalitativnimi in kvantitativnimi pristopi
- razumevanje aplikativne optike
- digitalna obdelava podatkov

Intended learning outcomes:

Knowledge and understanding:

- knowledge about the evolution of astronomical observations
- understanding of space conception and main physics processes in it
- ability for organisation and execution of astronomical observations
- basic knowledge in astronomical subjects in Slovene education and in adequate didactical approaches

Transferable/Key Skills and other attributes:

- ability of critical evaluation of information
- to be aware of limits of observation methods
- understanding of difference between qualitative and quantitative approaches
- understanding of applied optics
- digital data processing

Metode poučevanja in učenja:

Predavanja
Laboratorijske in terenske vaje
Individualno delo

Learning and teaching methods:

Lectures
Laboratory and field exercises
Individual work

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

Projektna naloga	50	Project work
ustni izpit	50	oral examination

Reference nosilca / Lecturer's references:

KRAŠNA, Marjan, REPNIK, Robert, BRADAČ, Zlatko, KRALJ, Samo. Sudden isotropic-nematic phase transition within a plan-parallel cell. *Mol. cryst. liq. cryst. (Phila. Pa. : 2003)*, apr. 2006, vol. 449, iss. 1, str. 127-135. [COBISS.SI-ID [14668040](#)], [JCR, WoS do 6. 11. 2012: št. citatov (TC): 2, čistih citatov (CI): 1, normirano št. čistih citatov (NC): 1, Scopus do 16. 10. 2012: št. citatov (TC): 2, čistih citatov (CI): 1, normirano št. čistih citatov (NC): 1]

REPNIK, Robert, BRADAČ, Zlatko, MATHELITSCH, Leopold, KRALJ, Samo. Cosmology in the laboratory. V: 5th Liquid Matter Conference of the European Physical Society, Konstanz, 2002. *Abstracts book*, (Europhysics conference abstracts, Vol. 26F). [S. l.]: European Physical Society, 2002, str. 115-116. [COBISS.SI-ID [12039944](#)]

KRALJ, Samo, REPNIK, Robert. Patterns in symmetry breaking transitions. V: LAMANAUSKAS, Vincentas (ur.). *Philosophy of mind and cognitive modelling in education - 2012*, (Problems of education in the 21st century, vol. 46). Siauliai: Scientific Methodological Center Scientia Educologica, 2012, str. 74-84, ilustr. [COBISS.SI-ID [19462920](#)]

FERK, Eva, OSRAJNIK, Damjan, REPNIK, Robert. Planisphere in astronomy teaching in primary school - a successful tool for development of natural science competences. V: *International Conference on New Horizons in Education - 2010 : proceedings book*. [Famagusta: Sakarya University], 2010, str. 681-686, ilustr. [COBISS.SI-ID [17835272](#)]

REPNIK, Robert, AMBROŽIČ, Milan, GRUBELNIK, Vladimir. Galileo on our web textbook on behalf of International year of astronomy 2009. V: AURER, Boris (ur.), BAČA, Miroslav (ur.), RABUZIN, Kornelije (ur.). 20th Central European Conference on Information and Intelligent Systems, September 23-25, 2009, Varaždin, Croatia. *Conference proceedings*. Zagreb: University of Zagreb; Varaždin: Faculty of Organisation and Informatics, 2009, str. 29-33. [COBISS.SI-ID [22984999](#)]