Univerza v Novi Gorici
Fakulteta za naravoslovje

University of Nova Gorica
School of Sciences

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Astrofizikalni laboratorij
Course name:	Astrophysics laboratory

Študijski program in stopnja **Study program and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Fizika in Astrofizika I. stopnja	/	3	2
Physics and Astrophysics I. level	/	3	2

Vrsta predmeta / Course type	izbirni / elective
Univerzitetna koda predmeta / University course code:	1FAF26

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Lab. work**	**Teren. vaje** **Field work**	**Samost. delo** **Indiv. work**	**ECTS**
10	/	50	/	/	120	6

Nosilec predmeta / Lecturer:	doc. dr. Tanja Petrushevska	
Jeziki / Languages:	**Predavanja / Lectures:**	slovenščina / English
	Vaje / Tutorial:	slovenščina / English

Pogoji za opravljanje študijskih obveznosti:	**Prerequisits:**
/	/

Vsebina:	**Syllabus outline:**
1. Formati podatkov in baze podatkov v astrofiziki 2. Standardni postopki za redukcijo in fotometrično kalibracijo CCD slik 3. Standardni postopki pri redukciji in ekstrakciji spektrov. Kalibracija valovne dolžine in spektrofotometrična kalibracija. Vpliv absorpcije atmosfere na spektre. 4. Pregled in primerjava podatkov iz ne-optičnih instrumentov 5. Analiza javnih podatkov trenutnih poskusov	1. Data formats and data bases in astrophysics 2. Standard procedures in reduction and photometric calibration of CCD images 3. Standard procedures in reduction and extraction of spectra. Wavelength calibration and spectrophotometric calibration. The effect of atmospheric absorption on the spectra. 4. Overview and comparison of data from non-optical instruments 5. Analysis of public data of current experiments

Temeljni literatura in viri / Basic readings:
To Measure the Sky: An Introduction to Observational Astronomy 1st Edition - Frederick R.

Chromey (2010)

Astronomy Methods: A Physical Approach to Astronomical Observations - Hale Bradt

Astrophysical Techniques 6th edition - Christopher R. Kitchin (2014)

Cilji in kompetence:	**Objectives and competences:**
Študenti bodo osvojili: - osnovne lastnosti astrofizikalnih podatkov in splošno razširjene baze podatkov; - izkušnje pri redukciji, kalibraciju in analizi javno dostopnih podatkovnih setov.	Students will learn: - basic concepts of astrophysical data formats and commonly used data bases; - hands on experience in reduction, calibration and analysis of the public photometric and spectroscopic astrophysical datasets.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- poznavanje področja obdelave astrofizkalnih podatkov in ustreznih metod analize	- knowledge of astrophysical data (sources and contents) and appropriate analysis tools and methods

Metode poučevanja in učenja:	**Learning and teaching methods:**
- predavanja - eksperimentalne vaje	- lectures - tutorials

Načini ocenjevanja:	**Utež / Weight (%)**	**Assessment:**
- domače naloge - zaključni projekt	50 50	- homeworks - final project

Reference nosilca / references of the course principal:
Dr. Tanja Petrushevska je docentka za področje fizike na Univerzi v Novi Gorici. Dr. Tanja Petrushevska is an assistant professor of physics at the University of Nova Gorica. Her research interests lie in the field of observational astrophysics and cosmology, especially time domain astronomy. Her research has showed the feasibility of searches for strongly lensed supernovae with ground-based facilities and resulted in the discovery of five of the most distant core-collapse supernovae with implications on the volumetric core-collapse rates to very high redshifts. It has furthermore showed the utility of supernovae for cosmological studies, by investigating the properties of the strongly lensed and very distant supernova. As part of the intermediate Palomar Transient Factory, she has contributed to the discovery of supernovae and their study, including the first resolved, multiply-imaged supernova Ia and the first supernova forming a compact neutron star binary. Her current research also includes studying tidal disruption flares and searching for short gamma-ray bursts from supernovae induced by axion-like particles which are candidates for dark matter.

Selected publications:

1. *High-redshift supernova rates measured with the gravitational telescope A1689.* T. Petrushevska, R. Amanullah, A. Goobar, S. Fabbro, J. Johansson, T. Kjellsson, C. Lidman, K. Paech, J. Richard, H. Dahle, R. Ferretti, J. P. Kneib, M. Limousin, J. Nordin and V. Stanishev, A&A, Volume 594, A54, 21 pp, (2016).

2. *Testing for redshift evolution of Type Ia supernovae using the strongly lensed PS1- 10afx at z = 1.4*. T. Petrushevska, R. Amanullah, M. Bulla, M. Kromer, R. Ferretti, A. Goobar and S. Papadogiannakis. A&A, vol. 603, A136, (2017).

3. *iPTF16geu: A multiply-imaged gravitationally lensed Type Ia supernova.* A. Goobar, 30 additional authors including T. Petrushevska, Science, vol. 356, 6335, 291-295 (2017).

4. *Searching for supernovae in the multiply-imaged galaxies behind the gravitational telescope A370*. T. Petrushevska, D. J. Lagattuta, R. Amanullah, A. Goobar, L. Hangard, S. Fabbro, C. Lidman, K. Paech, J. Richard, and J. P. Kneib, A&A vol. 614, A103, (2018)

5. *A hot and fast ultra-stripped supernova that likely formed a compact neutron star binary* K. De, 25 additional authors including T. Petrushevska, Science, vol. 362, 6411, (2018).

6. *Prospects for observing strongly lensed supernovae behind Hubble Frontier Fields galaxy clusters with the James Webb Space Telescope*. T. Petrushevska, T. Okamura, R. Kawamata, L. Hangard, G. Mahler and A. Goobar, Astronomy Reports, vol. 62, 12, (2018).