



### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet</b>	Nanoelektronika
<b>Course name</b>	Nanoelectronics

Študijski program in stopnja Study program and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Fizika in Astrofizika II. stopnja	Fizika trdne snovi	2	/
Physics and Astrophysics II. level	Solid state physics	2	/

<b>Vrsta predmeta / Course type</b>	obvezni / mandatory
<b>Univerzitetna koda predmeta / University course code</b>	2FTS10

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Lab. work	Teren. vaje Field work	Samost. delo Indiv. work	ECTS
30	/	30	/	/	120	6

<b>Nosilec predmeta / Lecturer</b>	prof. dr. Gvido Bratina	
<b>Jeziki / Languages</b>	<b>Predavanja / Lectures</b>	slovenščina / English
	<b>Vaje / Tutorial</b>	slovenščina / English

<b>Pogoji za opravljanje študijskih obveznosti</b>	<b>Prerequisites</b>
/	/

Vsebina	Syllabus outline
Polprevodniške heterostrukture	Semiconductor heterostructures
Posebni primeri kvantnih jam	Special cases of quantum wells
Tunelski transport	Tunnelling transport
Dvodimenzionalni plin elektronov	Twodimensional electron gas
Optične lastnosti kvantnih jam	Optical properties of quantum wells
Kvantne pike in kvantne žice	Quantum dots and quantum wires
Enoelektronski tranzistor	Single-electron transistor
Izdelava elektronskih nanostruktur	Fabrication of electronic nanostructures

<b>Temeljni literatura in viri / Basic readings</b>
J. H. Davies, <i>The Physics of low-dimensional semiconductors</i> , Cambridge (1998).

Cilji in kompetence	Objectives and competences
osvojitev osnovnih pojmov s področja elektronskih procesov v nanostrukturah samostojno zbiranje literature in priprava	understanding and usage of basic concepts of electronic processes in nanostructures preparation and presentation of seminar in the



seminarja s področja nanostruktur	field of nanostructures
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Predvideni študijski rezultati	Intended learning outcomes
Študenti bodo osvojili pojme in koncepte: s področja polprevodniških heterostruktur in posebnih kvantnih jam s področja nizkodimenzionalnih elektronskih struktur	Students will learn: fundamental concepts of semiconductor heterostructures and special quantum wells fundamental concepts, needed to describe low-dimensional electronic structures.

Metode poučevanja in učenja	Learning and teaching methods
- predavanja - seminarji	- lectures - seminar

Načini ocenjevanja	Utež / Weight (%)	Assessment
- seminar	50	- seminar
- ustni izpit	50	- oral exam

Reference nosilca / references of the course principal
<p>Prof. dr. Gvido Bratina je redni profesor za področje fizike na Univerzi v Novi Gorici. Gvido Bratina is a full professor of physics at the University of Nova Gorica.</p> <p>Izbrane objave / selected references:</p> <ol style="list-style-type: none"> <li>1. PATHIPATI, Srinivasa Rao, PAVLICA, Egon, PARVEZ, Khaled, FENG, Xinliang, MÜLLEN, Klaus, BRATINA, Gvido. Graphene flakes at the SiO<sub>2</sub>/organic-semiconductor interface for high-mobility field-effect transistors. <i>Organic electronics</i>, ISSN 1566-1199, 2015, vol. 27, str. 221-226, ilustr., doi: 10.1016/j.orgel.2015.09.004. [COBISS.SI-ID 4056059]</li> <li>2. CHHIKARA, Manisha, PAVLICA, Egon, MATKOVIĆ, Aleksandar, BELTAOS, Angela, GAJIĆ, Radoš, BRATINA, Gvido. Pentacene on graphene : differences between single layer and bilayer. <i>Carbon</i>, ISSN 0008-6223. [Print ed.], 2014, vol. 69, str. 162-168, doi: 10.1016/j.carbon.2013.12.002. [COBISS.SI-ID 2987003]</li> <li>3. PATHIPATI, Srinivasa Rao, PAVLICA, Egon, SCHLIERF, Andrea, EL GEMAYEL, Mirella, SAMORI, Paolo, PALERMO, Vincenzo, BRATINA, Gvido. Graphene-induced enhancement of n-type mobility in perylenediimide thin films. <i>The journal of physical chemistry. C, Nanomaterials and interfaces</i>, ISSN 1932-7447, 2014, vol. 118, no. 43, str. 24819-24826, doi: 10.1021/jp505463v. [COBISS.SI-ID 3614971]</li> <li>4. CHHIKARA, Manisha, PAVLICA, Egon, MATKOVIĆ, Aleksandar, GAJIĆ, Radoš, BRATINA, Gvido. Effect of water layer at the SiO<sub>2</sub>/graphene interface on pentacene morphology. <i>Langmuir</i>, ISSN 0743-7463, 2014, vol. 30, no. 39, str. 11681-11688, doi: 10.1021/la502970q. [COBISS.SI-ID 3574011]</li> </ol>



5. ORGIU, Emanuele, PAVLICA, Egon, BRATINA, Gvido, et al. Optically switchable transistor via energy-level phototuning in a bicomponent organic semiconductor. *Nature chemistry*, ISSN 1755-4330. [Print ed.], 2012, vol. 4, no. 8, str. 675-679, doi: 10.1038/nchem.1384. [COBISS.SI-ID 2411003]