



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Izbrana poglavja iz fizike mehke snovi
Course title:	Selected topics on soft matter physics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
FIZIKA		1. ali 2.	1., 2. ali 3.
PHYSICS		1. or 2.	1., 2. or 3.

Vrsta predmeta / Course type

Izbirni za modula Biofizika 3 in Fizika 1, 2, 3

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Mentorstvo Mentorship	Samost. delo Individ. work	ECTS
10					290	10

Nosilec predmeta / Lecturer:

Nataša Vaupotič

Jeziki /

Languages:

Predavanja / slovenski/Slovenian

Lectures:

Vaje / Tutorial:

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

Predznanje iz klasične in moderne fizike in fizike trdne snovi.

Prerequisites:

Preknowledge of classical and modern physics and solid state physics.

Vsebina:

Predstavljeni bodo aktualni primeri s področja fizike mehke snovi. Predavanja bodo izvedli tudi drugi predavatelji z Univerze v Mariboru ter vabljeni predavatelji iz drugih raziskovalnih organizacij v Sloveniji in raziskovalci iz tujine.

Content (Syllabus outline):

Recent advances in soft matter physics will be presented. Topics will be presented also by other lecturers from University of Maribor and invited lectures from other research organizations from Slovenia and abroad.

Predavanja bodo pokrivala področja raziskav osnovnih principov kot tudi področje aplikacij.

The lectures will cover research of basic principles and also of applications.

Temeljni literatura in viri / Readings:

- 1) M. Kleman, O.D. Lavrentovich, Soft Matter Physics, Springer-Verlag, New York, 2003,
- 2) P. M. Chaikin, T. C. Lubensky, Principles of Condensed Matter Physics, Cambridge University Press, Cambridge, England, 1995
- 3) Članki v revijah Evropskega (EPS) in Ameriškega (APS) fizikalnega združenja, Science, Nature, Scientific American.
- 4) Članki v revijah Ameriškega fizikalnega združenja (APS) in Ameriškega kemijskega združenja (ACS),
- 5) Članki v revijah Science, Nature in drugih vrhunskih revijah.

Cilji in kompetence:

Študenti poglobijo znanje s področja fizike mehkih sistemov, spoznajo najnovejše raziskave na tem področju, imajo možnost, da se usmerijo v raziskovalno delo na področju katerega od zunanjih predavateljev.

Objectives and competences:

Students acquire advanced knowledge on physics of soft systems. They get acquainted with recent advances in soft matter systems and could get oriented along a research focus of invited lecturers.

Predvideni študijski rezultati:

Znanje in razumevanje:

Razumevanje procesov v mehkih sistemih.

Prenosljive/ključne spretnosti in drugi atributi:

Rešitev problemov z matematičnimi orodji, numeričnimi metodami, univerzalnosti v fiziki in celosten pristop k reševanju problemov.

Intended learning outcomes:

Knowledge and understanding:

Understanding of processes in soft systems.

Transferable/Key Skills and other attributes:

Solving of problems with mathematical tools, numerical methods, universalities in physics and gained global approach on solving a problem.

Metode poučevanja in učenja:

Predavanja, konzultacije, izdelava seminarske naloge.

Learning and teaching methods:

Lectures, tutorials, written seminar.

Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)

3 Seminarji

Delež (v %) /

Weight (in %)

Assessment:

Type (examination, oral, coursework, project):

3 Seminars

100%

Reference nosilca / Lecturer's references:

1. VOGRIN, Martin, VAUPOTIČ, Nataša, WOJCIK, M. M., MIECZKOWSKI, Jozef, MADRAK, Karolina, POČIECHA, Damian, GÓRECKA, Ewa. Thermotropic cubic and tetragonal phases made of rod-like molecules. *PCCP. Physical chemistry chemical physics*, ISSN 1463-9076, 2014, vol. 16, issue 30, str. 16067-16074, doi: [10.1039/C4CP01641F](https://doi.org/10.1039/C4CP01641F). [COBISS.SI-ID [27813671](https://www.cobiss.si/id/27813671)]
2. VAUPOTIČ, Nataša, ČEPIČ, Mojca, OSIPOV, Mihail A., GÓRECKA, Ewa. Flexoelectricity in chiral nematic liquid crystals as a driving mechanism for the twist-bend and splay-bend modulated phases. *Physical review. E, Statistical, nonlinear, and soft matter physics*, ISSN 1539-3755, 2014, vol. 89, no. 3, 030501-1-030501-5, doi: [10.1103/PhysRevE.89.030501](https://doi.org/10.1103/PhysRevE.89.030501). [COBISS.SI-ID [27591975](https://www.cobiss.si/id/27591975)]
3. PAVLIN, Jerneja, VAUPOTIČ, Nataša, ČEPIČ, Mojca. Direction dependence of the extraordinary refraction index in uniaxial nematic liquid crystals. *European journal of physics*, ISSN 0143-0807, 2013, vol. 34, no. 2, str. 331-344, ilustr. http://iopscience.iop.org/0143-0807/34/2/331/pdf/0143-0807_34_2_331.pdf, doi: [10.1088/0143-0807/34/2/331](https://doi.org/10.1088/0143-0807/34/2/331). [COBISS.SI-ID [9541705](https://www.cobiss.si/id/9541705)]
4. SZCZYTKO, Jacek, VAUPOTIČ, Nataša, OSIPOV, Mihail A., MADRAK, Karolina, GÓRECKA, Ewa. Effect of dimerization on the field-induced birefringence in ferrofluids. *Physical review. E, Statistical, nonlinear, and soft matter physics*, ISSN 1539-3755, 2013, vol. 87, no. 6, str. 062322-1-062322-6, doi: [10.1103/PhysRevE.87.062322](https://doi.org/10.1103/PhysRevE.87.062322). [COBISS.SI-ID [26839079](https://www.cobiss.si/id/26839079)]
5. VAUPOTIČ, Nataša, POČIECHA, Damian, GÓRECKA, Ewa. Polar and apolar columnar phases made of bent-core mesogens. *Topics in current chemistry*, ISSN 0340-1022, 2012, vol. 318, str. 281-302, doi: [10.1007/128_2011_231](https://doi.org/10.1007/128_2011_231). [COBISS.SI-ID [25535015](https://www.cobiss.si/id/25535015)]