



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Izbrana poglavja iz fizike
Course title:	Selected topics in 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
5	5				290	10

Nosilec predmeta / Lecturer:

Marko Robnik

Jeziki /

Languages:

Predavanja / slovenski/Slovenian

Lectures:

Vaje / Tutorial: /

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

Ni posebnih zahtev.

Prerequisites:

No special prerequisites.

Vsebina:

Content (Syllabus outline):

Študenti se udeležijo seminarских predavanj gostujočih znanstvenikov raziskovalcev, kolokvijev, poletnih šol, delavnic ter drugih simpozijev, ki jih organizirata CAMTP in FNM. Študenti se aktivno udeležijo ene izmed navedenih konferenc oz. šol.

CAMTP organizira:

- Mednarodne poletne šole in konference »Let's Face Chaos through Nonlinear Dynamics« (vsaka tri leta)
- European Advanced Studies Conferences (vsako leto)
- Japan-Slovenia Seminars on Nonlinear Science (vsako leto)
- Božicne simpozije fizikov (vsako leto)
- SOCRATES Workshops (v sodelovanju z Univerzo v Marburgu, Nemčija)
- Redne raziskovalne seminarje na vseh področjih fizike

Izbiro druge konference, simpozija ali poletne šole potrди Oddelek za fiziko FNM UM.

Students attend seminar lectures of visiting scientists researchers, colloquia, summer schools, workshops, and other symposia, organized by CAMTP and FNM.

Students actively attend one of the proposed summer schools or conferences.

CAMTP organizies:

- International Summer Schools and Conferences
- »Let's Face Chaos through Nonlinear Dynamics« (every three years)
- European Advanced Studies Conferences (every year)
- Japan-Slovenia Seminars on Nonlinear Science (every year)
- Christmas Symposia of Physicists (every year)
- SOCRATES Workshops (in collaboration with University of Marburg)
- Regular research seminars in all fields of physics

The selection of other conference, symposium or summerschool should be confirmed by the Department of Physics FNM UM.

Temeljni literatura in viri / Readings:

- 1) L.D. Landau, E. M. Lifshitz, Mechanics, Butterworth-Heinemann, 1982.
- 2) L.D. Landau, E. M. Lifshitz, The Classical Theory of Fields, Butterworth-Heinemann, 1980.
- 3) L.D. Landau, E. M. Lifshitz, Quantum Mechanics: Non-Relativistic Theory, Butterworth-Heinemann, 1981.
- 4) V.B. Berestetskii, L.P. Pitaevskii, E.M. Lifshitz, Quantum Electrodynamics, Butterworth-Heinemann, 1982.
- 5) L.D. Landau, Statistical Physics, Butterworth-Heinemann, 1984.
- 6) L.D. Landau, E. M. Lifshitz, Fluid Mechanics, Butterworth-Heinemann, 1987.
- 7) L.D. Landau, L.P. Pitaevskii, E.M. Lifshitz, A.M. Kosevich, Theory of Elasticity, Butterworth-Heinemann, 1986.
- 8) L.D. Landau, L.P. Pitaevskii, E.M. Lifshitz, Electrodynamics of Continuous Media, Butterworth-Heinemann, 1986.
- 9) Članki v revijah Evropskega (EPS) in Ameriškega (APS) fizikalnega združenja, Science, Nature, Scientific American, Physics World, Physik Journal, Physics Today, Nature Physics, News and Reviews in Astronomy and Geophysics / Papers in the journals of European (EPS)

and American Physical Society (APS) as well as Science, Nature, Scientific American, Physics World, Physik Journal, Physics Today, Nature Physics, News and Reviews in Astronomy and Geophysics

Cilji in kompetence:

- Razumeti osnovne ideje na širokem področju moderne fizike ter povezave z drugimi področji
- Pridobiti dobro razgledanost nad aktualnimi tematikami sodobne fizike

Objectives and competences:

- Understanding the basic ideas in the broad domain of modern physics and the links to other fields
- Gaining good overview on the topical themes of modern physics

Predvideni študijski rezultati:

Znanje in razumevanje:

- Poglobljeno razumevanje idej, metod in rezultatov sodobne fizike

Prenesljive/ključne spretnosti in drugi atributi:

- sposobnost predstavitve pridobljenih raziskovalnih izsledkov s področja fizike v obliki javnih predstavitev na znanstvenih srečanjih
- poglobljeno razumevanje teoretskih in metodoloških konceptov z različnih področij moderne fizike
- mednarodna komunikativnost v vrhunskem znanstvenem in strokovnem okolju

Intended learning outcomes:

Knowledge and understanding:

- Deeper understanding of ideas, methods and results of modern physics

Transferable/Key Skills and other attributes:

- Capability of public presentation of research results from the field of physics to scientific community at the meetings
- Deeper understanding of theoretical and methodological concepts from different areas of modern physics
- Capability of communication in the top-level scientific community

Metode poučevanja in učenja:

Predavanja, seminar

Learning and teaching methods:

Lectures, seminar

Načini ocenjevanja:

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

- Seminarska naloga
- Ustna predstavitev naloge

Delež (v %) /

Weight (in %)

Assessment:

Type (examination, oral, coursework, project):

- Seminar work
- Oral presentation of the seminar work

Reference nosilca / Lecturer's references:

1. ANDRESAS, Dimitris, ROBNIK, Marko. Statistical properties of the energy in time-dependent homogeneous power law potentials. *Journal of physics. A, Mathematical and theoretical*, ISSN

1751-8113, 2014, vol. 47, issue 35, str. 355102-1 - 355102-10, doi: [10.1088/1751-8113/47/35/355102](https://doi.org/10.1088/1751-8113/47/35/355102). [COBISS.SI-ID 79388417]

2. GRUBELNIK, Vladimir, LOGAR, Marjan, ROBNIK, Marko. Quantum Fermi acceleration in the resonant gaps of a periodically driven one-dimensional potential box. *Journal of physics. A, Mathematical and theoretical*, ISSN 1751-8113, 2014, vol. 47, no. 35, str. 355103-1 - 355103-17, doi: [10.1088/1751-8113/47/35/355103](https://doi.org/10.1088/1751-8113/47/35/355103). [COBISS.SI-ID 18017814]

3. MANOS, Thanos, ROBNIK, Marko. Survey on the role of accelerator modes for anomalous diffusion : the case of the standard map. *Physical review. E, Statistical, nonlinear and soft matter physics*, ISSN 1550-2376. [Online ed.], 2014, vol. 89, iss. 2, str. 022905-1 - 022905-12, graf. prikazi, doi: [10.1103/PhysRevE.89.022905](https://doi.org/10.1103/PhysRevE.89.022905). [COBISS.SI-ID 77280257]

4. ANDRESAS, Dimitris, BATISTIĆ, Benjamin, ROBNIK, Marko. Statistical properties of one-dimensional parametrically kicked Hamilton systems. *Physical review. E, Statistical, nonlinear, and soft matter physics*, ISSN 1539-3755, 2014, vol. 89, no. 6, str. 062927-1-062927-14, graf. prikazi, doi: [10.1103/PhysRevE.89.062927](https://doi.org/10.1103/PhysRevE.89.062927). [COBISS.SI-ID 78977281]

5. BATISTIĆ, Benjamin, ROBNIK, Marko. Dynamical localization of chaotic eigenstates in the mixed-type systems: spectral statistics in a billiard system after separation of regular and chaotic eigenstates. *Journal of physics. A, Mathematical and theoretical*, ISSN 1751-8113, 2013, vol. 46, no. 31, str. 315102-1-315102-17. http://iopscience.iop.org/1751-8121/46/31/315102/pdf/1751-8121_46_31_315102.pdf, doi: [10.1088/1751-8113/46/31/315102](https://doi.org/10.1088/1751-8113/46/31/315102). [COBISS.SI-ID 75147009]