



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	<b>Mednarodne raziskave razlik v poučevanju fizikalnih vsebin</b>
<b>Course title:</b>	<b>International studies of differences in the teaching of physical topics</b>

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

**Vrsta predmeta / Course type**

Izbirni iz nabora Fizikalno - didaktični predmeti za modul Izobraževalna fizika 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:** Robert REPNIK

**Jeziki / Languages:**  
**Predavanja / Lectures:** slovenski/Slovenian  
**Vaje / Tutorial:**

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

Jih ni.

**Prerequisites:**

None.

**Vsebina:**

Razvoj poučevanja fizikalnih vsebin skozi čas na območju Slovenije.

Mednarodna primerjava razvoja poučevanja

**Content (Syllabus outline):**

The development of teaching physical topics over time in Slovenia.

International comparison of the development of

fizikalnih vsebin skozi čas.

Primerjalne študije razlik v poučevanju fizikalnih vsebin.

Raziskave in primerjave zastopanosti posameznih fizikalnih vsebin v poučevanju.

Uporaba znanstvenih metod pri raziskovanju razlik v poučevanju fizikalnih vsebin.

teaching physical topics over time.

Comparative studies of differences in the teaching of physics content.

Research and comparison of inclusion of particular physical topics in teaching.

Using scientific methods to explore differences in teaching physical topics.

### Temeljni literatura in viri / Readings:

1. Članki v znanstvenih in strokovnih revijah s področja izobraževanja fizike.
2. Poročila domačih in mednarodnih znanstvenih in strokovnih projektov s področja izobraževanja fizike.
3. L. Cohen, L. Manion, K. Morrison, *Research methods in education*, (Routledge, New York, 2009).
4. Spletne strani Oddelka za fiziko, projekta Razvoj naravoslovnih kompetenc in spletne strani Centra za didaktiko v Gradcu/Avstrija: <http://physik.didaktik-graz.at>
5. Haagen-Schützenhöfer, C. & Hopf, M. (2014). Development of a two-tier test-instrument for geometrical optics. In Constantinou, C.; Papadouris, N.; Hadjigeorgiou, A. (Hg.), E-Book Proceedings of the ESERA 2013 Conference: Science Education Research for Evidence-based Teaching and Coherence in Learning. (Strand 11, S.24-30)
6. Haagen-Schützenhöfer, C. (2014). Theory-Practice Gap: The relevance of students' conceptions for teaching geometrical optics in practice. In Dvorak, L.; Koudelková V. (Hg.), ICPE-EPEC Conference 2013: Active learning – in a changing world of new technologies. Prague. (S.144-152)
7. Haagen-Schützenhöfer, C. (2012). Improving the Quality of Lab-reports by using them as Lab Instructions. *The Physics Teacher*, 50(7), (S.430–433)
8. Haagen-Schützenhöfer, C. & Hopf, M. (2012). Standardization in Physics – First Steps in the Austrian Educational System. In Bruguière, C., Tiberghien, A. & Clément, P. (Hg.), E-Book Proceedings of the ESERA 2011 Conference: Science Learning and Citizenship. (Strand 10)
9. Haagen-Schützenhöfer, C. (2011). Crossing boundaries by changing the culture of teaching. A case study. In Hansen, K.-H., Gräber, W., Lang, M. & Couso, D. (Hrsg.), *Crossnet. Crossing Boundaries in Science Teacher Education*. Münster/New York: Waxmann. (S.192-218)
10. Talbot-Smith, M., Abell, S. K., Appleton, K., & Hanuscin, D. L. (Eds.). (2013). *Handbook of research on science education*. Routledge.
11. Driver, R., Guesne, E. & Tiberghien, A. (Hrsg.) (1985). *Children's ideas in science*, Buckingham: Open University Press.

### Cilji in kompetence:

Študent/ka:

- Pridobi dodatno znanje in poglobi obstoječe

### Objectives and competences:

A student:

- Gains additional knowledge and deepens the

znanje o inovativnih projektih izobraževalne fizike za izboljšanje kakovosti učenja in poučevanja fizike v osnovnih in srednjih šolah ter na univerzi.

- se usposobi za samostojno razvojnoraziskovalno delo na področju inovativnih projektov.

existing one about innovative projects in physics education for improvement of physics teaching and physics education quality in primary and secondary schools and universities.

- Is qualified for advanced independent development and research work on the field of innovation projects.

#### **Predvideni študijski rezultati:**

Znanje in razumevanje:

- Poglobljeno poznavanje in razumevanje didaktike fizike.
- Poglobljeno znanje in razumevanje raziskovanja fizikalno-didaktičnih procesov
- Usvojene znanstvene metode, potrebne za izvedbo mednarodnih primerjav poučevanja

Prenesljive/ključne spretnosti in drugi atributi:

- Sposobnost kritične uporabe znanstvenih in strokovnih spoznanj s področja didaktike fizike.
- Sposobnost samostojnega raziskovanja v didaktiki fizike.
- Spretnosti v prezentaciji, izražanju in objavi raziskovalnega dela.

#### **Intended learning outcomes:**

Knowledge and understanding:

- Deeper knowledge and understanding of the didactics of physics.
- Deeper knowledge and understanding of research processes in didactics of physics.
- Acquired scientific methods necessary for carrying out international comparisons of teaching

Transferable/Key Skills and other attributes:

- The ability of critical use and application of scientific and professional findings from the field of didactics of physics.
- The ability of independent research in didactics of physics.
- Writing and presentation skills and skills in publication of research work.

#### **Metode poučevanja in učenja:**

- predavanja
- obravnava študijskih primerov z diskusijo,
- projektno delo
- poučevanje na daljavo
- multimedijška predstavitev

#### **Learning and teaching methods:**

- interactive lectures
- case studies discussion,
- project work,
- distance learning,
- multimedia presentation.

#### **Načini ocenjevanja:**

Delež (v %) /

Weight (in %) **Assessment:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Type (examination, oral, coursework, project):
• Projektna naloga • Ustni izpit	60% 40%	• Project • Oral examination

**Reference nosilca / Lecturer's references:**

1. MATHELITSCH, Leopold, REPNIK, Robert, BRADAČ, Zlatko, VILFAN, Mojca, KRALJ, Samo. Flüssigkristalle im Überblick : Unentbehrlich in Natur, Technik und Forschung. *Physik in Unserer Zeit*, ISSN 0031-9252, 2003, vol. 34, str. 134-139. [COBISS.SI-ID [17476903](#)]
2. GERLIČ, Ivan, REPNIK, Robert. Conceptual learning of physics in Slovenian primary schools. V: LAMANAUSKAS, Vincentas (ur.). *Challenges of science, mathematics and technology teacher education in Slovenia*, (Problems of education in the 21st century, ISSN 1822-7864, vol. 14). Siauliai: Scientific Methodological Center Scientia Educologica, 2009, str. 65-69. [COBISS.SI-ID [17352968](#)]
3. REPNIK, Robert, GRUBELNIK, Vladimir. ICT and competences connected with the subject Environmental education in primary school. *Literacy information and computer education journal*, ISSN 2040-2589, mar. 2011, vol. 2, iss. 1, str. 270-276. <http://infonomics-society.org/LICEJ/ICT%20and%20Competences%20Connected%20with%20the%20Subject%20Environmental%20Education%20in%20Primary%20School.pdf>. [COBISS.SI-ID [19407624](#)]
4. ROVŠEK, Barbara, REPNIK, Robert. Physics competitions for learners of primary schools in Slovenia. V: *Teaching/learning physics : integrating research into practice : program and abstracts*. Palermo: Università degli Studi di Palermo, Dipartimento di Fisica e Chimica, 2014, str. 151. [COBISS.SI-ID [10122057](#)]
5. GRUBELNIK, Vladimir, MARHL, Marko, REPNIK, Robert. Modelling of realistic dynamical systems and development of natural science competences in education. V: *International Conference on New Horizons in Education - 2010 : proceedings book*. [Famagusta: Sakarya University], 2010, str. 574-578, ilustr. [COBISS.SI-ID [17923336](#)]