



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Analiza in razvoj fizikalnih učil in učnih pripomočkov
Course title:	The Analysis and Development of Teaching Aids and Equipment in Physics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
FIZIKA, 3. stopnja		1. ali 2.	1., 2. ali 4.
PHYSICS, 3 rd cycle		1. or 2.	1., 2. or 4.

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
10	5				165	6

Nosilec predmeta / Lecturer:

Jeziki / Languages:

Predavanja / Lectures:	slovenščina / Slovenian
Vaje / Tutorial:	slovenščina / Slovenian

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

Prerequisites:

Vsebina:

- Kurikularna analiza in struktura učnih programov fizike. Analiza klasičnih in sodobnih metod in oblik pouka fizike.
- Analiza in razvoj prostorov za pouk fizike. Pohištvena oprema. Energijski viri.
- Ergonomija šolskega delovnega mesta za poučevanje fizike. Varnostna oprema.
- Analiza in razvoj učnih, tehničnih in medijskih pripomočkov za pouk fizike.

Content (Syllabus outline):

- Curricular analysis and structure of curricula of physics. Analysis of classical and modern methods and shapes of physics teaching.
- Analysis and development of school places for physics teaching. Furniture equipment. Energy sources.
- Ergonomics of school work place for physics teaching. Safety equipment.

- Izvedba projekta priprave in izvedbe FI učila oz. učnih pripomočkov, prostorov, ergonomskih zahtev, računalniške eksperimentalne opreme itd.

- Analysis and development of educational, technical and media equipment for physics teaching.
- Project work on preparing and executing physical teaching aids, school places, ergonomics, computer experimental equipment etc.

Temeljni literatura in viri / Readings:

- 1) Resnick, D. Halliday: Fundamentals of Physics. London: Wiley and Sons, 1993.
- 2) Beiser: Concepts od Modern Physics. New York: Mc Graw-Hill, 1987.
- 3) Strnad. O poučevanju fizike. Sigma-DMFA, Ljubljana 2006.
- 4) Gerlič: Didaktika pouka fizike v osnovni šoli. PEF MB, 1992.
- 5) Gerlič, Udir: Problemski pouk fizike v osnovni šoli. Zavod RS za šolstvo, Ljubljana, 2006.
- 6) Gerlič: Sodobna informacijske tehnologija v izobraževanju. DZS, Ljubljana, 2000.
- 7) Učbeniki, priročniki, napotki za eksperimentalno delo slovenskih in tujih založb.
- 8) Revije: Physics Teacher, Physics Education, Technology&Learning,
- 9) Computers&Education, Educational Technilogy in slovenske fizikalne, računalniške ter didaktične revije.
- 10) Spletne strani Oddelka za fiziko in projekta Razvoj naravoslovnih kompetenc

Cilji in kompetence:

Študent pridobi poglobljeno znanje in razumevanje didaktike fizike in raziskovanja ter razvoja fizikalno-didaktičnih procesov.

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Objectives and competences:

Student acquires deep understanding of the subjects of didactics of physics and research and development of physical and didactical processes.

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Predvideni študijski rezultati:

Znanje in razumevanje:

Po uspešno zaključeni učni enoti študent:

- usvoji znanje o značilnosti sistemov izvajanja pouka fizike v svetu in pri nas,
- usvoji metodologijo analize inovativnih projektov in inovacij v poučevanju fizike,
- usvoji osnovna in zahtevnejša strokovna in didaktična znanja za snovanje, načrtovanje, pripravo, analizo in vrednotenje postopkov

Intended learning outcomes:

Knowledge and understanding:

On completion of this course the student

- gets knowledge about characteristic systems in physics teaching in our country and abroad.
- gets knowledge about methodology of analyses of innovative projects and innovations in physics education.

<p>razvoja fizikalnih učil in učnih pripomočkov za izvajanje tradicionalnega in sodobnega pouka fizike.</p> <ul style="list-style-type: none"> • <p>Prenesljive/ključne spretnosti in drugi atributi:</p> <ul style="list-style-type: none"> • Sposobnost kritične uporabe znanstvenih in strokovnih spoznanj s področja didaktike fizike. • Sposobnost samostojnega raziskovanja in razvoja. 	<ul style="list-style-type: none"> • gets basic, deeper professional and special didactic knowledge for planning and preparing the analyses and evaluation procedures in development of teaching tools in physics and of didactical equipment for traditional and modern education of physics. <p>Transferable/Key Skills and other attributes:</p> <ul style="list-style-type: none"> • Ability to critically use and apply scientific and professional knowledge from didactics of physics. • Ability of independent research and development.
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Metode poučevanja in učenja:

<p>Predavanja in seminar, ki bosta temeljila na obravnavi študijskih primerov, eksperimentalni demonstraciji in multimedijski predstavitvi. Poučevanje in učenje potekata z didaktično uporabo informacijsko-komunikacijske tehnologije.</p>
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Learning and teaching methods:

<p>Lectures and seminar that will be based on the case studies, experimental demonstration and multimedia presentation.</p> <p>Teaching and learning are done through the didactic use of ICT.</p>
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Delež (v %) /

Weight (in %) **Assessment:**

Načini ocenjevanja:

<p>Način (pisni izpit, ustno izpraševanje, naloge, projekt)</p> <ul style="list-style-type: none"> • Projektna naloga (izdelek in predstavitev) • Ustni izpit <p>Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.</p> <p>Pozitivna ocena projektne naloge je pogoj za pristop k izpitu.</p>	<p>40% 60%</p>	<p>Type (examination, oral, coursework, project):</p> <ul style="list-style-type: none"> • Project (work and presentation) • Oral examination <p>Each of the mentioned commitments must be assessed with a passing grade.</p> <p>Positive grade of project work is prerequisite for access to the exam.</p>
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Reference nosilca / Lecturer's references:

<p>1. ŪLEN, Simon, ČAGRAN, Branka, SLAVINEC, Mitja, GERLIČ, Ivan. Designing and evaluating the effectiveness of Physlet-based learning materials in supporting conceptual learning in secondary</p>

school physics. *Journal of science education and technology*, ISSN 1059-0145, 2014, vol. 23, iss. 5, str. 658-667, tabele, doi: 10.1007/s10956-014-9492-x. [COBISS.SI-ID 20475656]

2. ÜLEN, Simon, GERLIČ, Ivan. The conceptual learning of physics in Slovenian secondary schools. V: RAJKOVIČ, Vladislav (ur.), BERNIK, Mojca (ur.), RAJKOVIČ, Uroš (ur.). *Education in information society : thematic issue*, (Organizacija, ISSN 1318-5454, Letn. 45, 2012, št. 3). Kranj: Moderna organizacija, 2012, letn. 45, št. 3, str. 140-144, ilustr. <http://organizacija.fov.uni-mb.si/index.php/organizacija/article/view/465/884>, doi: 10.2478/v10051-012-0015-3. [COBISS.SI-ID 19205384]

3. REPNIK, Robert, GERLIČ, Ivan. Liquid crystals and development of natural science competences. V: REPNIK, Robert (ur.). *Proceedings od the 11th European Conference on Liquid Crystals, ECLC 2011, 6-11 February 2011, Maribor, Slovenia*, (Molecular crystals and liquid crystals, ISSN 1542-1406, vol. 553, no. 1, 2012). Philadelphia: Taylor and Francis, 2012, vol. 553, no. 1, str. 168-174, doi: 10.1080/15421406.2011.609464. [COBISS.SI-ID 19420680]

tipologija 1.08 -> 1.01

4. REPNIK, Robert, GERLIČ, Ivan. Liquid crystals and development of natural science competences. V: REPNIK, Robert (ur.). *Proceedings od the 11th European Conference on Liquid Crystals, ECLC 2011, 6-11 February 2011, Maribor, Slovenia*, (Molecular crystals and liquid crystals, ISSN 1542-1406, vol. 553, no. 1, 2012). Philadelphia: Taylor and Francis, 2012, vol. 553, no. 1, str. 168-174, doi: 10.1080/15421406.2011.609464. [COBISS.SI-ID 19420680]

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