



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

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|----------------------|--|
| Predmet: | Analiza in razvoj fizikalnih učil in učnih pripomočkov |
| Course title: | Analysis and development of teaching aids and equipments in physics |

| 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. or 2. | 2. or 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 | Terenske vaje Field work | Samost. delo Individ. work | ECTS |
|------------------------|--------------------|------------------|------------------------------|-----------------------------|-------------------------------|------|
| 5 | 5 | | | | 290 | 10 |

Nosilec predmeta / Lecturer:

Ivan Gerlič

**Jeziki /
Languages:**

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

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

Ni pogojev.

Prerequisites:

None.

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

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

poučevanje fizike. Varnostna oprema.

- Analiza in razvoj učnih, tehničnih in medijskih pripomočkov za pouk fizike.
- Izvedba projekta priprave in izvedbe FI učila oz. učnih pripomočkov, prostorov, ergonomskih zahtev, računalniške eksperimentalne opreme itd.

physics teaching. Safety equipment.

- 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 of 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 Technology in slovenske fizikalne, računalniške ter didaktične revije.
- 10) Spletne strani Oddelka za fiziko in projekta Razvoj naravoslovnih kompetenc

Cilji in kompetence:

Študent/ka:

- 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 razvoja fizikalnih učil in učnih pripomočkov za izvajanje tradicionalnega in sodobnega pouka fizike.

Objectives and competences:

A 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.
- 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.

Predvideni študijski rezultati:

Intended learning outcomes:

Znanje in razumevanje:

- Poglobljeno poznavanje in razumevanje didaktike fizike.
- Poglobljeno razumevanje raziskovanja in razvoja fizikalno-didaktičnih procesov

Prenesljive/ključne spretnosti in drugi atributi:

- Sposobnost kritične uporabe znanstvenih in strokovnih spoznanj s področja didaktike fizike.
- Sposobnost samostojnega raziskovanja in razvoja.

Knowledge and understanding:

- Deep understanding of the subjects of didactics of physics.
- Deep understanding of research and development of physical and didactical processes.

Transferable/Key Skills and other attributes:

- Ability to critically use and apply scientific and professional knowledge from didactics of physics.
- Ability of independent research and development.

Metode poučevanja in učenja:

Predavanja in seminar, ki bosta temeljila na obravnavi študijskih primerov, eksperimentalni demonstraciji in multimedijski predstavitvi

Learning and teaching methods:

Lectures and seminar that will be based on the case studies, experimental demonstration and multimedia presentation.

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

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

- Projektna naloga
- Ustni izpit

40%
60%

Type (examination, oral, coursework, project):

- Project
- Oral examination

Reference nosilca / Lecturer's references:

1. ÜLEN, Simon, ČAGRAN, Branka, SLAVINEC, Mitja, GERLIČ, Ivan. Designing and evaluating the effectiveness of Physlet-based learning materials in supporting conceptual learning in secondary 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](https://doi.org/10.1007/s10956-014-9492-x). [COBISS.SI-ID 20475656]
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. GERLIČ, Ivan. Challenges of advanced technologies and school of the future. V: RAJKOVIČ, Vladislav (ur.), et al. *Education in information society*, (Organizacija, ISSN 1318-5454, Letn. 43, 2010, št. 1). Kranj: Moderna organizacija, 2010, str. 49-53, ilustr., doi: [10.2478/v10051-010-0006-](https://doi.org/10.2478/v10051-010-0006-)

1. [COBISS.SI-ID [17451016](#)]

4. REPNIK, Robert, CVETKO, Matej, GERLIČ, Ivan. Development of some natural science competences in undergraduate study by training visualization skills on subject liquid crystal phases and structures. V: *Proceedings of the 23rd International Liquid Crystal Conference (ILCC 2010)*, (Molecular Crystals and Liquid Crystals, ISSN 1542-1406, vol. 547; 1). Philadelphia: Taylor and Francis, 2011, vol. 547, no. 1, str. 249-254, doi: [10.1080/15421406.2011.572770](https://doi.org/10.1080/15421406.2011.572770). [COBISS.SI-ID [19419912](#)] tipologija 1.08 -> 1.01

5. GERLIČ, Ivan. Didactics and communications criterion of distance education. 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. 56-64. [COBISS.SI-ID [17352712](#)]