



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	Projektno delo v naravoslovju
<b>Course title:</b>	<i>Project Work in Science Education</i>

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Izobraževalna kemija, 1. stopnja		2. ali 3.	zimski ali poletni
Educational Chemistry, 1 <sup>st</sup> degree			

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Druge oblike študija	Samost. delo Individ. work	ECTS
15	15				150	6

Nosilec predmeta / Lecturer:

Jeziki / Languages: Predavanja / Lectures:   
Vaje / Tutorial:

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

Znanja kemije in fizike na nivoju temeljnega univerzitetnega kurza

**Prerequisites:**

Knowledge of Chemistry and Physics at the level of basic university course

**Vsebina:**

(1) Metodologija načrtovanja in priprave naravoslovnih projektov;  
(2) Študij primera multi-in interdisciplinarnega naravoslovnega projekta;  
(3) Didaktično-metodološki kurikularni pristopi več- in medpredmetnega poučevanja in

**Content (Syllabus outline):**

(1) Methodology of planning and preparation of science projects;  
(2) Case study one of science multidisciplinary and interdisciplinary projects;  
(3) Didactic-methodological curricular approaches of multi- and interdisciplinary

učenja;

(4) Študij primera didaktičnega načrtovanja in izvajanja več- in medpredmetne projektne naloge na stopnji osnovnega oz. srednjega izobraževanja.

based-teaching and learning projects;

(4) Case study of didactic planning and implementing of multi- and interdisciplinary project task at compulsory and secondary education.

#### Temeljni literatura in viri / Readings:

1. Učni načrti in katalogi znanj naravoslovnih predmetov in matematike na stopnji osnovnega in srednjega izobraževanja (dostopni na [www.mss.gov.si](http://www.mss.gov.si) ).
2. Ferik Savec, Vesna; Projektno učno delo pri učenju naravoslovnih vsebin : učbenik; Fakulteta za naravoslovje in matematiko, Maribor; 2010.
3. učbeniki s področja teme projektne naloge.
4. članki v domačih in tujih strokovnih in znanstvenih revijah s področja teme projektne naloge.
5. Diplomski in magistrski dela na področju projektne naloge. (dostopna elektronsko preko različnih knjižnic)

#### Cilji in kompetence:

(1) spoznati metodologijo znanstvenega načrtovanja in priprave naravoslovnih projektov;  
(2) proučiti študij primera multi- in interdisciplinarnega naravoslovnega projekta;  
(3) analizirati kurikularno medpredmetno povezovanje kot ključno sestavino osnovno- in srednješolskih programov kemijskega izobraževanja;  
(4) izdelati študij primera didaktičnega načrtovanja in izvajanja medpredmetne projektne naloge na stopnji osnovnega oz. srednjega izobraževanja.

#### Objectives and competences:

(1) to know the methodology for science planning and preparing of science projects;  
(2) to study a case study of multi- and interdisciplinary science project;  
(3) to analyse a curricular interdisciplinary connection as a key component of compulsory and secondary chemical education;  
(4) to elaborate a case study of didactic planning and implementing of multidisciplinary project task at a level of compulsory or secondary education.

#### Predvideni študijski rezultati:

##### Znanje in razumevanje:

(1) sposobnost prepoznavanja metodoloških faz znanstvenega načrtovanja in priprave multi-in interdisciplinarnih naravoslovnih projektov;  
(2) sposobnost didaktično-metodološke analize kurikularnih ciljev osnovno- in srednješolskih kemijskih programov z vidika več- in medpredmetnega povezovanja;  
(3) usposobljenost za didaktično načrtovanje in vodenje več- in medpredmetnih projektne nalog na stopnji osnovnega oz. srednjega izobraževanja.

#### Intended learning outcomes:

##### Knowledge and Understanding:

(1) ability for recognition of methodological steps for science planning and preparation of multi- and interdisciplinary science projects;  
(2) ability for didactic-methodological analysis of curricular aims and goals of compulsory and secondary chemical education from a point of multi- and interdisciplinary connection;  
(3) qualification for didactic planning and guiding of multi- and interdisciplinary projects at a level of compulsory and secondary education.

<b>Prenesljive/ključne spretnosti in drugi atributi:</b> (1) sposobnost prepoznavanja povezav med različnimi vidiki znanstvenih spoznanj in kurikularnega naravoslovnega znanja ter uporabo teh povezav na aktualnih področjih v gospodarskih in družbenih dejavnosti; (2) sposobnost komuniciranja s strokovnjaki iz drugih strokovnih in znanstvenih področij.	<b>Transferable/Key Skills and other attributes:</b> (1) ability to recognize the linkage among different aspects of science cognitions and curricular science knowledge as well as using these connections at current economic and social activities; (2) ability for communication by scientists and specialists from other fields.
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**Metode poučevanja in učenja:**

Predavanja Seminarsko delo Samostojno individualizirano skupinsko delo
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**Learning and teaching methods:**

Lectures Seminary work Self-dependent individualised group work
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Delež (v %) /

**Načini ocenjevanja:**

Weight (in %)

**Assessment:**

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Projektno delo:		Project work:
a) načrtovanje	20	a) planning
b) izvedba	20	b) performance
c) predstavitev	20	c) presentation
d) zagovor	40	d) defence

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

- VOGRIN, Matjaž, 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, [in press] 2014, 8 str., doi: [10.1039/C4CP01641F](https://doi.org/10.1039/C4CP01641F). [COBISS.SI-ID [27813671](https://www.cobiss.si/id/27813671)]
- GORNIK, Kristina, ČEPIČ, Mojca, VAUPOTIČ, Nataša. Effect of a bias electric field on the structure and dielectric response of the ferroelectric smectic-A liquid crystal in thin planar cells. *Physical review. E, Statistical, nonlinear, and soft matter physics*, ISSN 1539-3755, 2014, vol. 89, no. 1, str. 012501-1-012501-9, doi: [10.1103/PhysRevE.89.012501](https://doi.org/10.1103/PhysRevE.89.012501). [COBISS.SI-ID [27378983](https://www.cobiss.si/id/27378983)]
- 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)]
- SIKOŠEK, Darinka, ŽARIĆ, Kornelia. Implementation of process-targeted activities of prospective chemistry teachers during continuous teaching practice: a rational comparative analysis of teaching methods according to the expressed competencies. V: LAMANAUSKAS, Vincentas (ur.). *Education in a changing society - 2013*, (Problems of education in the 21st century, ISSN 1822-7864, vol. 53). Siauliai: Scientific Methodological Center Scientia Educologica, 2013, str. 74-88. [COBISS.SI-ID [19855112](https://www.cobiss.si/id/19855112)]
- SIKOŠEK, Darinka, ŽUŽELJ, Mateja. Using chemical models for developing natural science competences in teaching chemistry: from pupils as model assemblers to pupils as creators of self-made models. V: LAMANAUSKAS, Vincentas (ur.). *Education in a changing society - 2013*,

(Problems of education in the 21st century, ISSN 1822-7864, vol. 53). Siauliai: Scientific Methodological Center Scientia Educologica, 2013, str. 89-98. [COBISS.SI-ID [19855368](#)]

**3.** SIKOŠEK, Darinka. Didaktična načela pri obravnavi nekaterih konceptov v kemijskih učbenikih na Slovenskem skozi čas = Treatment of certain concepts by didactic principles in chemical textbooks through time in Slovenia. *Šolska kronika*, ISSN 1318-6728, 2012, letn. 21 = 45, št. 1/2, str. 41-52, ilustr. [COBISS.SI-ID [35178029](#)]