



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	Diplomski seminar
<b>Course title:</b>	Diploma seminar

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Fizika		3	6
Physics			

**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
5	30				325	12

**Nosilec predmeta / Lecturer:**

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

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

Pred predstavitvijo zaključnega seminarja naj ima študent opravljene vse druge obveznosti na študijskem programu Fizika.

**Prerequisites:**

Before the concluding seminar is presented the student should have accomplished all other obligations at the study programme Physics.

**Vsebina:**

Osnove strokovnega pisanja. Sestava članka, seminarja, diplome. Pisanje enačb, sklicevanje, citiranje, vnašanje slik. Iskanje virov in njihovo vrednotenje. Brskanje po bazah, pregled znanstvenih revij, ki so dostopne v mreži računalnikov UM. Priprava multimedijske predstavitve strokovnega ali znanstvenoraziskovalnega dela. Osnove znanstvenoraziskovalnega dela: določitev problema, pregled in vrednotenje obstoječe literature, načrtovanje samostojnega

**Content (Syllabus outline):**

Fundamentals of scientific writing. Composition of a scientific paper, seminar, thesis. Writing of equations, citations, referencing, figures. Searching for sources and their evaluation. Searching the scientific bases, scientific journals that are on-line in the University computer web. Preparation of the multimedia projection of the scientific work. Introduction to the scientific research: selection of a problem, survey and evaluation of the existing literature, planning of the individual experimental or theoretical

eksperimentalnega ali teoretičnega dela.  
Vrednotenje rezultatov, prikaz in analiza.  
Elementi dispozicije zaključnega dela.

Priprava elektronske predstavitve kot podpora ustni predstavitvi in nujni elementi predstavitve v obliki plakata.

Vsebina kratkega seminarja:  
Vsak študent napiše krajši seminar iz teme, ki jo izbere sam ali pa jo določi nosilec. Pri pisanju strogo upošteva pravila strokovnega pisanja in pripravi predstavitev v elektronski obliki.

Zaključni seminar:  
Študent izbere temo, ki jo poglobljeno preuči. Vsebina se lahko navezuje na delo, ki ga opravi npr. v okviru izbirnega predmeta ali strokovnega usposabljanja. Pripravi in predstavi dispozicijo zaključnega seminarja. Priporočena dolžina zaključnega seminarja je okoli 20 strani. Željeno je, da je predstavitev seminarja zadnje dejanje študija na 1. stopnji, t.j. študent ga predstavi, ko je opravil vse preostale obveznosti po programu. Študent izdelava plakat, na katerem predstavi vsebino zaključnega seminarja, ustno predstavitev pa podpre z ustrezno uporabo IKT.

research. Evaluation of the results, their presentation and analysis.  
Elements of a disposition of a thesis.  
How to prepare an ICT support to oral presentation and the elements of poster presentation.

Short seminar:  
Each student writes a seminar on a topic of his/her own choice or a topic assigned by the lecturer. The rules for scientific writing should be obeyed strictly. The electronic multimedia presentation is prepared.

Concluding seminar:  
Each student chooses the topic of the seminar, which can be a part of the work within the scope of another subject or the practical work. Each student prepares and presents a disposition of the concluding seminar. The recommended length of the seminar is approximately 20 pages. It will be encouraged that the presentation of the seminar is the last act of the study, i.e. the student presents the seminar when all the rest of the exams in the study program are passed. Each student prepares a poster presenting the topic of the concluding seminar. Oral presentation should be supported by a proper use of ICT.

### **Temeljni literatura in viri / Readings:**

1. R. A. Day, B. Gastel, How to write and publish a scientific paper, Greenwood Press, 2006.
2. Znanstveni in strokovni članki v znanstvenih in strokovnih revijah / Scientific and technical papers in scientific and technical journals
3. Učbeniki s področja seminarja / textbooks on the topic chosen for the seminar

### **Cilji in kompetence:**

Študenti usvojijo pravila in značilnosti strokovnega pisanja, naučijo se iskati vire, jih vrednotiti in uporabiti. Znajo načrtovati raziskovalno delo, ga izvesti ter vrednotiti, prikazati in analizirati dobljene rezultate.

### **Objectives and competences:**

Students master the rules and characteristics of scientific writing, they learn how to search for sources, how to evaluate and use them. They learn to plan a research work, to carry it out and to evaluate, present and analyse results.

### **Predvideni študijski rezultati:**

### **Intended learning outcomes:**

**Znanje in razumevanje:**

Po uspešno zaključeni učni enoti bodo študenti zmožni:

- načrtovati raziskovalno delo, kar pomeni, da si znajo zastaviti cilj, postaviti hipoteze, predvidijo uporabo ustreznih metod dela, opredelijo predpostavke in omejitve ter predvidijo rezultate dela;
- poiskati, ovrednotiti, analizirati in uporabiti različne vire ob upoštevanju avtorskih pravic;
- ovrednotiti rezultate raziskovalnega dela;
- poročati o raziskovanem delu pisno, ustno ob podpori IKT in s plakatom ter razlikovati med značilnostmi posameznega načina predstavitve.

**Prenesljive/ključne spretnosti in drugi atributi:**

Po uspešno zaključeni učni enoti bodo študenti zmožni:

- samostojno načrtovati in izvesti kompleksen poskus ali raziskavo, uporabiti primerne metode za analizo podatkov in ovrednotiti njihovo zanesljivost;
- reševati odprte probleme tako, da podrobno opredelijo problem, identificirajo ključne značilnosti in uporabijo različne pristope za rešitev problema;
- korektno uporabljati strokovni jezik;
- uporabljati IKT za komunikacijo in analizo.

**Metode poučevanja in učenja:**

predavanja  
seminar  
vodeno raziskovalno delo  
razlaga  
razgovor  
demonstracija  
delo s tekstom  
metoda pisnih in grafičnih del  
uporaba simulacij

**Knowledge and understanding:**

On completion of this course students will be able to:

- plan a research work, which means that they can define a goal, set hypotheses, choose appropriate research methods, define assumptions and limitations and predict the results;
- search, evaluate, analyse and use different sources by obeying the authorship rights;
- evaluate the results of the research work;
- report on the research in terms of a written text, orally with a support of ICT and with a poster; they can tell the characteristic differences among different types of presentations.

**Transferable/Key Skills and other attributes:**

On completion of this course students will be able to:

- independently plan and carry out a complex experiment or research, use appropriate methods for the data analysis and evaluate data reliability;
- solve open problems in a way that they define the problem, identify its crucial characteristics and use different methods to solve the problem;
- correctly use the scientific language;
- use ICT support for communication and analysis.

**Learning and teaching methods:**

lectures  
seminar  
guided research work  
explanation  
discussion  
demonstration  
work with text  
work with graphic elements  
use of simulations

uporaba simulacijskih okolij  
raziskovalno učenje  
eksperimentalno delo

use of simulation software  
inquiry based learning  
experimental work

**Načini ocenjevanja:**

Delež (v %) /  
Weight (in %)

**Assessment:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
Krajši seminar	<b>10</b>	Short seminar
Zaključni seminar	<b>90</b>	Concluding seminar

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

1. SALAMONCZYK, Mirosław, VAUPOTIČ, Nataša, POCIECHA, Damian, WALKER, Rebecca, STOREY, John M. D., IMRIE, Corrie T., WANG, Cheng, ZHU, Chenhui, GÓRECKA, Ewa. Multi-level chirality in liquid crystals formed by achiral molecules. *Nature communications*, ISSN 2041-1723, 2019, vol. 8, str. 1922-1-1922-8, doi: [10.1038/s41467-019-09862-y](https://doi.org/10.1038/s41467-019-09862-y). [COBISS.SI-ID [32322855](https://www.cobiss.si/id/32322855)].
2. VAUPOTIČ, Nataša, ALI, Muhammad, MAJEWSKI, P., GÓRECKA, Ewa, POCIECHA, Damian. Polarization gratings spontaneously formed from a helical twist-bend nematic phase. *ChemPhysChem : a European journal of chemical physics and physical chemistry*, ISSN 1439-4235. [Print ed.], [in press] 2018, 15 str., doi: [10.1002/cphc.201800360](https://doi.org/10.1002/cphc.201800360). [COBISS.SI-ID [31667751](https://www.cobiss.si/id/31667751)].
3. POCIECHA, Damian, CRAWFORD, Catriona A., PATERSON, Daniel A., STOREY, John M. D., IMRIE, Corrie T., VAUPOTIČ, Nataša, GÓRECKA, Ewa. Critical behavior of the optical birefringence at the nematic to twist-bend nematic phase transition. *Physical review. E*, ISSN 2470-0045, 2018, vol. 98, no. 5, str. 052706-1-052706-5, doi: [10.1103/PhysRevE.98.052706](https://doi.org/10.1103/PhysRevE.98.052706). [COBISS.SI-ID [31948071](https://www.cobiss.si/id/31948071)].
4. SALAMONCZYK, Mirosław, VAUPOTIČ, Nataša, POCIECHA, Damian, WANG, Cheng, ZHU, Chenhui, GÓRECKA, Ewa. Structure of nanoscale-pitch helical phases : blue phase and twist-bend nematic phase resolved by resonant soft X-ray scattering. *Soft matter*, ISSN 1744-683X, 2017, vol. 13, no. 38, str. 6694-6699, doi: [10.1039/c7sm00967d](https://doi.org/10.1039/c7sm00967d). [COBISS.SI-ID [30804519](https://www.cobiss.si/id/30804519)].
5. GÓRECKA, Ewa, VAUPOTIČ, Nataša, ZEP, Anna, POCIECHA, Damian. From sponges to nanotubes : a change of nanocrystal morphology for acute-angle bent-core molecules. *Angewandte Chemie*, ISSN 1521-3773. [Online ed.], 2016, vol. 55, no. 40, str. 12238-12242, doi: [10.1002/anie.201604915](https://doi.org/10.1002/anie.201604915). [COBISS.SI-ID [29763367](https://www.cobiss.si/id/29763367)].
6. VAUPOTIČ, Nataša, CURK, Samo, OSIPOV, Mikhail, ČEPIČ, Mojca, TAKEZOE, Hideo, GÓRECKA, Ewa. Short-range smectic fluctuations and the flexoelectric model of modulated nematic liquid crystal. *Physical review. E, Statistical, nonlinear, and soft matter physics*, ISSN 1539-3755, 2016, vol. 93, no. 2, str. 022704-1-022704-5, doi: [10.1103/PhysRevE.93.022704](https://doi.org/10.1103/PhysRevE.93.022704). [COBISS.SI-ID [29301799](https://www.cobiss.si/id/29301799)].