



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	Uvod v znanstvenoraziskovalno delo
<b>Course title:</b>	Introduction in scientific research work

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika, 3. stopnja		1.	1.
Mathematics, 3 <sup>rd</sup> Degree		1 <sup>st</sup>	1 <sup>st</sup>

Vrsta predmeta / Course type:

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
15				15 (konzultacije)	150	6

Nosilec predmeta / Lecturer:

Jeziki / Languages:

Predavanja / Lectures:

Vaje / Tutorial:

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

Ni posebnih pogojev.

Prerequisites:

No special requirements.

### Vsebina:

- Doktorski študent in mentor, naloge študenta in mentorja, postopek in zahteve za pridobitev doktorata znanosti na UM.
- Temeljne znanstveno raziskovalne metode na področju matematike.
- Znanstveni viri: knjige, učbeniki in članki, znanstvene podatkovne baze in storitve (Web of Science, ProQuest, Science Direct, MathSciNet, zbMATH).
- Sporočanje o znanstvenih rezultatih: osebne komunikacije, tehnična poročila, konferenčni članki, članki v znanstvenih revijah, patenti, dizertacije.
- Kvaliteta objav: JCR, faktor vpliva (IF), kriteriji na UM, kriteriji na FNM.
- Raziskovalni kodeks, avtorstvo, raziskovalna poštenost in etični vidiki raziskovanja ter plagiatstvo.
- Pisanje članka: struktura znanstvenega članka, jasnost in jedrnatost, pregled stanja, citiranje, opis lastne metode in izpostava novosti.
- Priprava končnega članka, izbira primerne revije, seznanitev s časovnimi roki in zahtevano obliko, pismo uredniku, izpolnitev zahtev recenzentov.
- Pisanje znanstvenih del v LaTeXu.
- Predstavitev znanstvenih idej in raziskav: občinstvo, cilji nastopa, priprava prosojnic, priprava nastopa.

### Content (Syllabus outline):

- PhD student and mentor, duties of students and mentors, procedure and requirements for obtaining PhD at UM.
- Basic scientific methods in mathematics.
- Scientific sources: books, textbooks and papers, scientific databases and services (Web of Science, ProQuest, Science Direct, MathSciNet, zbMATH)
- Reporting of the research results: personal communications, technical reports, conference papers, journal papers, patents, theses.
- Quality of publications: Journal Citation Report, impact factor, peer review, criteria at UM, criteria at FNM.
- Research code, authorship, research honesty, research ethics and plagiarism.
- Writing a paper: structure of a scientific paper, clarity and conciseness, state of the art, citation, description of our methods and emphasizing novelties.
- Final preparation of the paper, selection of suitable journal, acquainting with the deadlines and formats, Letter-to-Editor, following the suggestions of reviewers.
- Writing scientific papers in LaTeX.
- Presentation of scientific ideas and research achievements: audience, purposes of presentation, preparation of slides, preparation of appearance.

### Temeljni literatura in viri / Readings:

- Kandiller, L. Principles of mathematics in operations research, Berlin: Springer-Verlag 2007.
- Makarovič, J. Misel in sporocilo: Kako uspešno študirati, raziskovati in predstaviti svoje ideje. Ljubljana: DDU Univerzum.
- Toporišič, J. (ur.). Slovenski pravopis. Pravila. Ljubljana: SAZU, DZS
- Gill, J. Essential mathematics for political and social research, Cambridge: Cambridge University Press, 2006
- Mackiw, G. Applications of abstract algebra, New York: John Wiley & Sons
- P. Dunleavy: Authoring a PhD Thesis: How to Plan, Draft, Write and Finish a Doctoral Thesis, Palgrave MacMillan, Hampshire, 2003.
- H. Kopka, P. W. Daly, Guide to LaTeX, Addison-Wesley Professional, 2003.

**Cilji in kompetence:**

- Pripraviti študente za bodoče delo na doktorski disertaciji.
- Študent se usposobi za izbiro in uporabo domače ter tuje strokovne literature na svojem področju dela in dodatnih virov, potrebnih za rešitev zastavljenega problema.

**Objectives and competences:**

- To prepare students for their future independent work on the PhD thesis.
- Students acquaintain the ability to select and use national and international scientific journals and monographies in their area of research as well as to find additional sources necessary to solve the choosen problem

**Predvideni študijski rezultati:****Znanje in razumevanje:**

Po zaključku tega predmeta bo študent sposoben

- izkazati znanje in razumevanje elementarnih znanstvenih metod,
- razumeti pomen in obvladati objavlanje raziskovalnih dosežkov,
- izkazati razumevanje različnih znanstvenih virov,
- razlikovati med vrstami znanstvenih objav,
- izkazati znanje in razumevanje raziskovalne etike,
- prepoznati plagiatorstvo,
- izkazati znanje in razumevanje potrebno pri oblikovanju doktorskih tez, pri strukturiranju doktorske disertacije in pri njenem zagovoru,
- poznavanje osnovnih strategij v komunikaciji s končnim uporabnikom raziskav.

Prenesljive/ključne spretnosti in drugi atributi:

- strokovno zapisovanje in izražanje matematičnih vsebin
- obvladanje reševanja strokovnih problemov
- suvereno predstavljanje ključnih spoznanj in spretnost argumentiranja

**Intended learning outcomes:****Knowledge and understanding:**

On completion of this course the student will be able to

- demonstrate knowledge and understanding of elementary scientific methods
- understanding importance and demonstrate knowledge of publishing and presenting scientific achievements,
- distinguish between different scientific sources,
- demonstrate understanding of research ethics,
- recognise plagiarism,
- demonstrate knowledge and understanding needed at expressing hypotheses, structuring and defending PhD thesis,
- Understanding basic approaches in compunction with end user of research results.

Transferable/Key Skills and other attributes:

- expressing mathematical contents in oral and written form
- ability to solve specific mathematical problems clear presentation of the results of research work and efficient argumentation

**Metode poučevanja in učenja:**

- predavanja;
- konzultacije;
- samostojni študij.

**Learning and teaching methods:**

- lectures;
- consultations;
- self-study.

Delež (v %) /

Weight (in %)

**Assessment:****Načini ocenjevanja:**

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

- pisni izdelek - članek
- ustna predstavitev članka.

70 %

30 %

Type (examination, oral, coursework, project):

- written product - a paper
- oral presentation of the paper

## Reference nosilca / Lecturer's references:

1. BREŠAR, Boštjan, KLAVŽAR, Sandi, RALL, Douglas F., WASH, Kirsti. Packing chromatic number,  $(1, 1, 2, 2)$ -colorings, and characterizing the Petersen graph. *Aequationes mathematicae*, ISSN 0001-9054, 2017, vol. 91, iss. 1, str. 169-184. <http://dx.doi.org/10.1007/s00010-016-0461-8>. [COBISS.SI-ID [17889113](#)]
2. BREŠAR, Boštjan, KLAVŽAR, Sandi, RALL, Douglas F., WASH, Kirsti. Packing chromatic number under local changes in a graph. *Discrete Mathematics*, ISSN 0012-365X. [Print ed.], 2017, vol. 340, iss. 5, str. 1110-1115. <http://dx.doi.org/10.1016/j.disc.2016.09.030>. [COBISS.SI-ID [17926233](#)]
3. BREŠAR, Boštjan, DORBEC, Paul, KLAVŽAR, Sandi, KOŠMRLJ, Gašper. How long can one bluff in the domination game?. *Discussiones mathematicae, Graph theory*, ISSN 1234-3099, 2017, vol. 37, no. 2, str. 337-352. <http://www.discuss.wmie.uz.zgora.pl/php/discuss3.php?ip=&url=pdf&nIdA=25196&nIdSesji=-1>, doi: [10.7151/dmgt.1899](https://doi.org/10.7151/dmgt.1899). [COBISS.SI-ID [17978457](#)]
4. BREŠAR, Boštjan, GOLOGRANC, Tanja, KOS, Tim. Dominating sequences under atomic changes with applications in Sierpiński and interval graphs. *Applicable analysis and discrete mathematics*, ISSN 1452-8630, 2016, vol. 10, no. 2, str. 518-531. <http://dx.doi.org/10.2298/AADM161005024B>. [COBISS.SI-ID [17807705](#)]
5. BREŠAR, Boštjan, HENNING, Michael A., RALL, Douglas F. Total dominating sequences in graphs. *Discrete Mathematics*, ISSN 0012-365X. [Print ed.], 2016, vol. 339, iss. 6, str. 1665-1676. <http://dx.doi.org/10.1016/j.disc.2016.01.017>. [COBISS.SI-ID [17670233](#)]