



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Metrični prostori
Course title:	Metric Spaces

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester
Enovit magistrski študijski program druge stopnje Predmetni učitelj	/	3. ali/or 4.	6. ali /or 8.
Five-year master's degree program Subject Teacher	/		

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30		15			45	3

Nosilec predmeta / Lecturer:

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

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

Prerequisites:

Vsebina:

- Metrični prostori. Primeri metrik. Primeri ravninskih metrik. Ekvivalentne metrike.
- Normirani prostori.
- Prostori s skalarnim produktom.
- Odprte in zaprte krogle. Odprte in zaprte množice.
- Notranjost, rob, zaprtje in zunanost množice.
- Podprostori metričnih prostorov. Produkti metričnih prostorov.
- Zaporedja v metričnih prostorih. Konvergenca in enakomerna konvergenca. Polnost.
- Zveznost in enakomerna zveznost.
- Kompaktnost in povezanost.

Content (Syllabus outline):

- Metric spaces. Examples of metrics. Examples of metrics in the plane. Equivalent metrics.
- Normed spaces.
- Spaces with scalar product.
- Open and closed balls. Open and closed sets.
- Interior, boundary, closure and exterior of a set.
- Subspaces of metric spaces. Product spaces.
- Sequences in metric spaces. Convergence and uniform convergence. Complete metric spaces.
- Continuous and uniformly continuous functions.
- Compact and connected spaces.

Temeljni literatura in viri / Readings:

J. Vrabec: *Metricni prostori*. Ljubljana: DMFA, 1993.

A. Suhodolc: *Metricni prostor, Hilbertov prostor, Fourierova analiza, Laplaceova transformacija*.

Matematični rokopisi 23, Ljubljana: DMFA, 1998.

V. Bryant: *Metric Spaces: Iteration and Application*. Cambridge: Cambridge University Press, 1985.

D. Benkovic: *Analiza II* (dodatna gradiva na spletu)

Cilji in kompetence:

Posplošiti rezultate v zvezi z odprtimi, zaprtimi intervali, s konvergenco realnih zaporedij in z zveznostjo realnih funkcij na metrične prostore.

Objectives and competences:

To generalize the results about closed intervals, convergent sequences in real line, and the continuity of real functions to metric spaces.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Študent obvlada osnovne koncepte v metričnih prostorih. Zaveda se pomena odprtih, zaprtih množic, kompaktnosti,

Intended learning outcomes:

Knowledge and Understanding:

- To understand basic concepts of metric spaces . To be aware of the importance of open sets, closed sets, compactness,

<p>polnosti in povezanosti metričnih prostorov.</p> <p>Prenesljive/ključne spretnosti in drugi atributi:</p> <ul style="list-style-type: none"> • Prenos znanja obravnavanih metod na druga področja, predvsem skozi uporabo metrike in zveznih funkcij 	<p>completeness and connectedness of metric spaces</p> <p>Transferable/Key Skills and other attributes:</p> <ul style="list-style-type: none"> • Knowledge transfer of treated methods into other fields, basically through the use of metric and continuous functions.
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Metode poučevanja in učenja:

<ul style="list-style-type: none"> • Predavanja • Seminarske vaje • Individualno delo
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Learning and teaching methods:

<ul style="list-style-type: none"> • Lectures • Tutorial • Individual work

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

<p>Pisni izpit – problemi</p> <p>Ustni izpit – teorija</p> <p>Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.</p> <p>Opravljen pisni izpit – problemi je pogoj za pristop k ustnemu izpitu – teorija.</p>	<p>50%</p> <p>50%</p>	<p>Written exam – problems</p> <p>Oral exam – theory</p> <p>Each of the mentioned assessments must be assessed with a passing grade.</p> <p>Passing grade of written exam – problems is required to take the oral exam – theory.</p>
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Reference nosilca / Lecturer's references:

<ol style="list-style-type: none"> 1. BANIČ, Iztok, ČREPNIJAK, Matevž, MERHAR, Matej, MILUTINOVIĆ, Uroš, SOVIČ, Tina. The closed subset theorem for inverse limits with upper semicontinuous bonding functions. <i>Bulletin of the Malaysian Mathematical Society</i>, ISSN 0126-6705, 2019, vol. 42, iss. 3, str. 835-846, doi: 10.1007/s40840-017-0517-5. [COBISS.SI-ID 23281928]. 2. BANIČ, Iztok, ČREPNIJAK, Matevž. Inverse component cropping sequences and connected inverse limits over intervals. <i>Glasnik matematički. Serija 3</i>, ISSN 0017-095X, 2018, vol. 53, no. 2, str. 371-384. https://web.math.pmf.unizg.hr/glasnik/53.2/53(2)-09.pdf, doi: 10.3336/gm.53.2.09. [COBISS.SI-ID 24323848]. 3. BANIČ, Iztok, ČREPNIJAK, Matevž. Markov pairs, quasi Markov functions and inverse limits. <i>Houston journal of mathematics</i>, ISSN 0362-1588, 2018, vol. 44, no. 2, str. 695-707. https://www.math.uh.edu/~hjm/restricted/pdf44(2)/16banic.pdf. [COBISS.SI-ID 18407001]. 4. BANIČ, Iztok, ČREPNIJAK, Matevž, MERHAR, Matej, MILUTINOVIĆ, Uroš. The (weak) full projection property for inverse limits with upper semicontinuous bonding functions. <i>Mediterranean journal of mathematics</i>, ISSN 1660-5446, Aug. 2018, vol. 15, iss. 4, str. 1-21, doi: 10.1007/s00009-018-1209-6. [COBISS.SI-ID 23960328].
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5. ČREPŇJAK, MatevŇ, TRATNIK, Niko. The Szeged index and the Wiener index of partial cubes with applications to chemical graphs. Applied mathematics and computation, ISSN 0096-3003. [Print ed.], 2017, vol. 309, str. 324-333, doi: 10.1016/j.amc.2017.04.011. [COBISS.SI-ID 23105544].