

UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)						
<b>Predmet:</b>		Uvod v geometrijsko topologijo				
<b>Course title:</b>		Introduction to geometric topology				
<b>Študijski program in stopnja</b> Study programme and level		<b>Študijska smer</b> Study field		<b>Letnik</b> Academic year	<b>Semester</b> Semester	
Interdisciplinarni univerzitetni študijski program Računalništvo in matematika		ni smeri		3	drugi	
Interdisciplinary first cycle academic study programme Computer Science and Mathematics		none		3	second	
<b>Vrsta predmeta / Course type</b>				izbirni / elective		
<b>Univerzitetna koda predmeta / University course code:</b>				27219		
<b>Predavanja</b> Lectures	<b>Seminar</b> Seminar	<b>Vaje</b> Tutorial	<b>Klinične vaje</b> work	<b>Druge oblike študija</b>	<b>Samost. delo</b> Individ. work	<b>ECTS</b>
30		30			90	5
<b>Nosilec predmeta / Lecturer:</b>				prof. dr. Dušan Repovš, prof. dr. Sašo Strle		
<b>Jeziki / Languages:</b>		<b>Predavanja / Lectures:</b>		slovenski / Slovene		
		<b>Vaje / Tutorial:</b>		slovenski / Slovene		
<b>Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:</b>				<b>Prerequisites:</b>		
Vpis v letnik študija.				Enrolment in the programme.		
Opravljen predmet Splošna topologija.				Completed course Point-set topology.		
<b>Vsebina:</b>				<b>Content (Syllabus outline):</b>		

<p>Kvocienčna topologija, zvezne preslikave na kvocienčnih, zlepkah. Delovanja grup in prostori orbit. Projektivni prostori.</p> <p>Brouwerjev izrek o negibni točki, Jordanov izrek, Brouwerjev izrek o invarianci odprtih množic.</p> <p>Topološke mnogoterosti, konstrukcije mnogoterosti. Poliedrske ploskve, Eulerjeva karakteristika. Klasifikacija sklenjenih ploskev.</p> <p>Simplicialni kompleksi in poliedri.</p>	<p>Quotient topology, continuous maps on quotients, adjunction spaces. Group actions and orbit spaces. Projective spaces.</p> <p>Brouwer's fixed point theorem, the Jordan curve theorem, Brouwer's invariance of domain theorem.</p> <p>Topological manifolds constructions of manifolds. Polyhedral surfaces, Euler characteristic. Classification of closed surfaces.</p> <p>Simplicial complexes and polyhedra.</p>
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### Temeljni literatura in viri / Readings:

<p>J. Dugundji: Topology, Allyn and Bacon, Boston, 1978.</p> <p>W. S. Massey: Algebraic Topology: An Introduction, Springer, New York-Heidelberg, 1989.</p> <p>J. R. Munkres: Topology : A First Course, Prentice Hall, Englewood Cliffs, 1975.</p>
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### Cilji in kompetence:

<p>Študent spozna osnovne pojme topologije evklidskih prostorov in geometrijske topologije kot so Jordanov in Brouwerjev izrek, simplicialni kompleksi in poliedri ter mnogoterosti.</p>
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### Objectives and competences:

<p>Student gets familiar with basic concepts of topology of Euclidian spaces and geometric topology, such as Jordan and Brouwer theorems, simplicial complexes and polihedra and manifolds.</p>
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### Predvideni študijski rezultati:

<p>Znanje in razumevanje: Razumevanje pojmov kvocienčne topologije, osnovnih vprašanj topologije evklidskih prostorov ter odnosa med lokalno in globalno podobo geometrijskih objektov. Poznavanje osnovnih prijemov za delo z geometričnimi objekti.</p> <p>Uporaba: V področjih matematike, ki delajo z geometričnimi objekti (kompleksna in globalna analiza, dinamični sistemi, numerična</p>
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### Intended learning outcomes:

<p>Knowledge and understanding: Understanding of notions such as quotient topology, basic questions of topology of Euclidian spaces and relations between local and global picture of geometric objects. Knowledge of basic concepts of geometric objects.</p> <p>Application: In the fields of mathematics, where geometric objects do appear (complex and global analysis, dynamic systems, numerical</p>
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matematika, mehanika, teorija grafov), v računalništvu (grafika, prepoznavanje vzorcev), v fiziki, kemiji in drugih naravoslovnih in tehničnih vedah.

Refleksija: Razumevanje teorije na podlagi primerov in uporabe.

Prenosljive spretnosti – niso vezane le na en predmet: Formulacija problemov v primernem jeziku, reševanje in analiza doseženega na primerih, prehajanje iz lokalnih na globalne lastnosti.

mathematics, mechanics, graph theory), in computing (graphics, pattern recognition), in physics, chemistry and other natural sciences and engineering.

Reflection: Understanding of the theory from the applications.

Transferable skills: Formulation of the problem in an appropriate language, the ability to solve and analyze the progress on the cases, the transition from local to global properties.

**Metode poučevanja in učenja:**

Predavanja, vaje, domače naloge, seminarske naloge, konzultacije

**Learning and teaching methods:**

Lectures, exercises, homework, seminar work, consultations

**Načini ocenjevanja:**

Delež (v %) /

Weight (in %)

**Assessment:**

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

izpit iz vaj,

izpit iz teorije

ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)

50%

50%

Type (examination, oral, coursework, project):

written exam

oral exam

grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

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

Dušan Repovš:

KARIMOV, Umed H., REPOVŠ, Dušan. On generalized 3-manifolds which are not homologically locally connected. *Topology and its Applications*, ISSN 0166-8641. [Print ed.], 2013, vol. 160, iss. 3,

str. 445-449. [COBISS.SI-ID 16558681]

CÁRDENAS, Manuel, LASHERAS, Francisco F., QUINTERO, Antonio, REPOVŠ, Dušan. On manifolds with nonhomogeneous factors. Central European Journal of Mathematics, ISSN 1895-1074, 2012, vol. 10, no. 3, str. 857-862. [COBISS.SI-ID 16241753]

BANAKH, Taras, REPOVŠ, Dušan. Direct limit topologies in the categories of topological groups and of uniform spaces. Tohoku mathematical journal, ISSN 0040-8735, 2012, vol. 64, no. 1, str. 1-24. [COBISS.SI-ID 16215897]

CENCELJ, Matija, REPOVŠ, Dušan. Topologija, (Zbirka Pitagora). 1. ponatis. Ljubljana: Pedagoška fakulteta, 2011. XVI, 169 str., ilustr. ISBN 978-86-7735-051-2. [COBISS.SI-ID 254230528]

Sašo Strle:

OWENS, Brendan, STRLE, Sašo. A characterization of the  $\mathbb{Z} \oplus \mathbb{Z}(\Delta)$  lattice and definite nonunimodular intersection forms. American journal of mathematics, ISSN 0002-9327, 2012, vol. 134, no. 4, str. 891-913. [COBISS.SI-ID 16408153]

GRIGSBY, J. Elisenda, RUBERMAN, Daniel, STRLE, Sašo. Knot concordance and Heegaard Floer homology invariants in branched covers. Geometry & topology, ISSN 1364-0380, 2008, vol. 12, iss. 4, str. 2249-2275. [COBISS.SI-ID 14892121]

OWENS, Brendan, STRLE, Sašo. A characterisation of the  $\langle 1 \oplus 3 \rangle$  form and applications to rational homology spheres. Mathematical research letters, ISSN 1073-2780, 2006, vol. 13, iss. 2, str. 259-271. [COBISS.SI-ID 13873241]