

UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2016/17)						
Predmet:		Algebraična topologija 2				
Course title:		Algebraic topology 2				
Študijski program in stopnja Study programme and level		Študijska smer Study field		Letnik Academic year		Semester Semester
Magistrski študijski program Finančna matematika		ni smeri		1 ali 2		prvi ali drugi
Master's study programme Financial Mathematics		none		1 or 2		first or second
Vrsta predmeta / Course type				izbirni / elective		
Univerzitetna koda predmeta / University course code:				M2311		
Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30	15	30			105	6
Nosilec predmeta / Lecturer:		prof. dr. Janez Mrčun, prof. dr. Petar Pavešić, prof. dr. Dušan Repovš, prof. dr. Sašo Strle				
Jeziki / Languages:		Predavanja / Lectures: slovenski / Slovene, angleški / English				
		Vaje / Tutorial: slovenski / Slovene, angleški / English				
Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:				Prerequisites:		
Vpis v letnik študija.				Enrolment in the programme.		
Vsebina:				Content (Syllabus outline):		

<p>Homotopija, homotopska ekvivalenca, razširitve in dvigi homotopij, homotopska kategorija.</p> <p>CW kompleksi, konstrukcija, topološke lastnosti, celularne preslikave.</p> <p>Homotopske grupe, eksaktna zaporedja para in vlaknenja, homotopski izrez.</p> <p>Kohomološke grupe, definicija in osnovne lastnosti, računanje, uporaba. Konstrukcija kohomoloških grup. Kohomološki kolobar.</p>	<p>Homotopy, homotopy equivalence, extensions and liftings of homotopies, homotopy category. CW complexes, construction, topological properties, cellular maps.</p> <p>Homotopy groups, exact sequences of a pair and of a fibration, homotopy excision.</p> <p>Cohomology groups, definition and properties, computation, applications. Construction of cohomology groups. Cohomology ring.</p>
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Temeljni literatura in viri / Readings:

<p>A. Hatcher: Algebraic Topology, Cambridge Univ. Press, Cambridge, 2002.</p>
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Cilji in kompetence:

<p>Študent spozna osnovne pojme algebraične topologije kot so homotopija, celični prostori, homotopske grupe in kohomološke grupe.</p>
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Objectives and competences:

<p>Student learns basic concepts of algebraic topology: homotopy, cellular spaces, homotopy groups and cohomology groups.</p>

Predvideni študijski rezultati:

<p>Znanje in razumevanje:</p> <p>Poznavanje osnovnih pojmov in tehnik za delo s homotopskimi in kohomološkimi grupami. Razumevanje homotopske invariance in prijemov za obravnavanje geometrijskih vprašanj s pomočjo algebre.</p> <p>Uporaba:</p> <p>V področjih matematike, ki delajo z</p>

Intended learning outcomes:

<p>Knowledge and understanding:</p> <p>Basic concepts and techniques for the computation of homotopy and cohomology groups. Understanding of the concepts of homotopy invariance and of approaches to geometric problems by algebraic methods.</p> <p>Application:</p> <p>Parts of mathematics with strong geometric</p>
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<p>geometričnimi objekti (kompleksna in globalna analiza, dinamični sistemi, geometrijska in diferencialna topologija, teorija grafov), v računalništvu (grafika, prepoznavanje vzorcev, topološka analiza podatkov, robotika), v teoretični fiziki.</p> <p>Refleksija:</p> <p>Razumevanje teorije na podlagi primerov in uporabe.</p> <p>Prenosljive spretnosti – niso vezane le na en predmet:</p> <p>Formulacija problemov v primernem jeziku, reševanje in analiza doseženega na primerih, prepoznavanje algebraičnih struktur v geometriji.</p>	<p>content (complex and global analysis, geometric and differential topology, graph theory), computer science (computer graphics, pattern recognition, topological data analysis, robotics), theoretical physics.</p> <p>Reflection:</p> <p>Understanding of theoretical concepts through examples and applications.</p> <p>Transferable skills:</p> <p>Recognition of algebraic structures in geometry, appropriate formulation of problems.</p>
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Metode poučevanja in učenja:

<p>predavanja, vaje, domače naloge, konzultacije</p>
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Learning and teaching methods:

<p>Lectures, exercises, homeworks, consultations</p>
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Delež (v %) /
Weight (in %)

Načini ocenjevanja:

Assessment:

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
izpit iz vaj		written exam
ustni izpit		oral exam
Ocene: 1-5 (negativno), 6-10 (pozitivno)	50%	
(po Statutu UL)	50%	Grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

Reference nosilca / Lecturer's references:

Petar Pavešić:

PAVEŠIĆ, Petar. The Hopf invariant one problem, (Podiplomski seminar iz matematike, 23). Ljubljana: Društvo matematikov, fizikov in astronomov Slovenije, 1995. 65 str. ISBN 961-212-050-1. [COBISS.SI-ID 53969664]

PAVEŠIĆ, Petar. Reducibility of self-homotopy equivalences. Proceedings. Section A, Mathematics, ISSN 0308-2105, 2007, vol. 137, iss 2, str. 389-413. [COBISS.SI-ID 14371929]

PAVEŠIĆ, Petar, PICCININI, Renzo A. Fibrations and their classification, (Research and exposition in mathematics, vol. 33). Lemgo: Heldermann, cop. 2013. XIII, 158 str., ilustr. ISBN 978-3-88538-233-1. [COBISS.SI-ID 16616793]

Janez Mrčun:

MOERDIJK, Ieke, MRČUN, Janez. Introduction to foliations and Lie groupoids, (Cambridge studies in advanced mathematics, 91). Cambridge, UK: Cambridge University Press, 2003. IX, 173 str., ilustr. ISBN 0-521-83197-0. [COBISS.SI-ID 12683097]

MOERDIJK, Ieke, MRČUN, Janez. Lie groupoids, sheaves and cohomology. V: EuroSchool PQR2003 on Poisson geometry, deformation quantisation and group representations, Université Libre de Bruxelles, June 13-17, 2003. GUTT, Simone (ur.), RAWNSLEY, John Howard (ur.), STERNHEIMER, Daniel (ur.). Poisson geometry, deformation quantisation and group representations, (London Mathematical Society lecture note series, ISSN 0076-0552, 323). Cambridge [etc.]: Cambridge University Press, cop. 2005, str. 147-272. [COBISS.SI-ID 13657689]

MRČUN, Janez. Topologija, (Izbrana poglavja iz matematike in računalništva, 44). Ljubljana: DMFA - založništvo, 2008. VI, 147 str., ilustr. ISBN 978-961-212-207-2. [COBISS.SI-ID 243021824]

Sašo Strle:

OWENS, Brendan, STRLE, Sašo. A characterisation of the $n < 1 > [oplus] < 3 >$ 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]

OWENS, Brendan, STRLE, Sašo. Rational homology spheres and the four-ball genus of knots. Advances in mathematics, ISSN 0001-8708, 2006, vol. 200, iss. 1, str. 196-216. [COBISS.SI-ID 13875033]

STRLE, Sašo. Bounds on genus and geometric intersections from cylindrical end moduli spaces. Journal of differential geometry, ISSN 0022-040X, 2003, vol. 65, no. 3, str. 469-511. [COBISS.SI-ID 13135193]

Dušan Repovš:

HEGENBARTH, Friedrich, MURANOV, Jurij Vladimirovič, REPOVŠ, Dušan. Browder-Livesay filtrations and the example of Cappell and Shaneson. Milan journal of mathematics, ISSN 1424-9286, 2013,

vol. 81, iss. 1, str. 79-97. [COBISS.SI-ID 16619097]

KARIMOV, Umed H., REPOVŠ, Dušan. Examples of cohomology manifolds which are not homologically locally connected. *Topology and its Applications*, ISSN 0166-8641. [Print ed.], 2008, vol. 155, iss. 11, str. 1169-1174. [COBISS.SI-ID 14678105]

REPOVŠ, Dušan, SKOPENKOV, Mikhail, SPAGGIARI, Fulvia. On the Pontryagin-Steenrod-Wu theorem. *Israel journal of mathematics*, ISSN 0021-2172, 2005, vol. 145, str. 341-348. [COBISS.SI-ID 13451353]