



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Algebrska topologija
Course title:	Algebraic Topology

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika, 2. stopnja	Modul R1	1. ali 2.	1. ali 3.
Mathematics, 2 nd degree	Module R1	1. or 2.	1. or 3.

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
45		30			135	7

Nosilec predmeta / Lecturer:

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

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

Poznavanje algeberskih struktur in topologije.

Prerequisites:

Knowledge of algebraic structures and topology..

Vsebina:

Kategorije in funktorji. Izomorfizmi. Homotopija, homotopska kategorija topoloških prostorov.
Funktor fundamentalne grupe. Krovni prostori. Primeri uporabe.
Simplicialni kompleksi in poliedri. Funktor simplicialne homologije. Eulerjeva karakteristika, Bettijeva števila. Osnove homološke algebre. Druge homološke teorije.

Content (Syllabus outline):

Categories and functors. Isomorphisms. Homotopy, homotopy theory of topological spaces.
The fundamental group functor. Covering spaces. Examples.
Simplicial complexes and polyhedra. The simplicial homology functor. Euler characteristic, Betti numbers. Fundamentals of homological algebra. Other homology theories.

Temeljni literatura in viri / Readings:

J.R.Munkres: Topology: a first course, Englewood Cliffs, NJ, Prentice-Hall, 1975
 E.H.Spanier: Algebraic topology, New York (etc.), McGraw-Hill, 1966
 M.Cencelj: Simplicialni kompleksi in simplicialna homologija, Ljubljana, Pedagoška fakulteta, 1996

Cilji in kompetence:

Obvladati osnovne tehnike dela s funkciji algebrske topologije.

Objectives and competences:

Students learn how to use the basic techniques of work with algebraic topology functors.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Uporaba kategorij in funktojev.
- Sposobnost uporabe osnovnih tehnik dela s konkretnimi funkciji algebrske topologije.

Prenosljive/ključne spretnosti in drugi atributi:

- Algebrska topologija je področje, ki povezuje algebro in topologijo. Je močan aparat, ki se ga da uporabiti pri reševanju zelo različnih problemov.

Intended learning outcomes:

Knowledge and Understanding:

- The use of categories and functors.
- Be able to use the basic techniques of work with specific algebraic topology functors.

Transferable/Key Skills and other attributes:

- Algebraic topology connects algebra and topology. It is a powerful apparatus that can be used in solving of many different problems

Metode poučevanja in učenja:

- Predavanja
- Seminarske vaje

Learning and teaching methods:

- Lectures
- Tutorial

Načini ocenjevanja:

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

Izpit:
 Pisni izpit – problemi
 Ustni izpit – teorija

Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.

Pozitivna ocena pri pisnem izpitu - problemi je pogoj za pristop k ustnemu izpitu – teorija.

Pisni izpit – problemi se lahko nadomesti z dvema delnima testoma (ki sta sprotni obveznosti).

Delež (v %) /
 Weight (in %)

50%
 50%

Assessment:

Type (examination, oral, coursework, project):

Exams:
 Written exam – problems
 Oral exam – theory

Each of the mentioned assessments must be assessed with a passing grade.

Passing grade of the written exam – problems is required for taking the oral exam – theory.

Written exam – problems can be replaced by two mid-term tests.

Reference nosilca / Lecturer's references:		
<p>1. BANIČ, Iztok, ČREPNJAK, Matevž, MERHAR, Matej, MILUTINOVIĆ, Uroš, SOVIČ, Tina. Ważewski's universal dendrite as an inverse limit with one set-valued bonding function. <i>Preprint series</i>, 2012, vol. 50, št. 1169, str. 1-33. http://www.imfm.si/preprinti/PDF/01169.pdf. [COBISS.SI-ID 16194137]</p> <p>2. BANIČ, Iztok, ČREPNJAK, Matevž, MERHAR, Matej, MILUTINOVIĆ, Uroš. Paths through inverse limits. <i>Topol. appl.</i>. [Print ed.], 2011, vol. 158, iss. 9, str. 1099-1112. http://dx.doi.org/10.1016/j.topol.2011.03.001. [COBISS.SI-ID 18474504]</p> <p>3. BANIČ, Iztok, ČREPNJAK, Matevž, MERHAR, Matej, MILUTINOVIĆ, Uroš. Limits of inverse limits. <i>Topol. appl.</i>. [Print ed.], 2010, vol. 157, iss. 2, str. 439-450. http://dx.doi.org/10.1016/j.topol.2009.10.002. [COBISS.SI-ID 15310169]</p> <p>4. KLAVŽAR, Sandi, MILUTINOVIĆ, Uroš, PETR, Ciril. Stern polynomials. <i>Adv. appl. math.</i>, 2007, vol. 39, iss. 1, str. 86-95. http://dx.doi.org/10.1016/j.aam.2006.01.003. [COBISS.SI-ID 14276441]</p> <p>5. IVANŠIĆ, Ivan, MILUTINOVIĆ, Uroš. Closed embeddings into Lipscomb's universal space. <i>Glas. mat.</i>, 2007, vol. 42, no. 1, str. 95-108. [COBISS.SI-ID 14338393]</p>		