Univerza v Mariboru

Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Algebraične strukture**
Course title:	Algebraic structures

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Izobraževalna matematika – dvopredmetni, 1. stopnja		**1.**	**2.**
Educational mathematics – Double-major, 1st degree		**1.**	**2.**

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**			**105**	**6**

Nosilec predmeta / Lecturer: Dušan Pagon

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Izpit iz Matričnega računa	Exam from Matrix Algebra

Vsebina:	**Content (Syllabus outline):**
Vektorski prostori: prostori in podprostori; baza; dimenzija; vsote in direktne vsote. Linearne preslikave: primeri in osnovne lastnosti; jedro in slika; prostori linearnih preslikav; izomorfizmi vektorskih prostorov. Linearne preslikave in matrike: matriki prirejena preslikava; preslikavi prirejena matrika; sprememba baze in podobne matrike. Lastne vrednosti in lastni vektorji: osnovne	Vector spaces: spaces and subspaces; base; dimension; sums and direct sums. Linear transformations: examples and basic properties; kernel and image; spaces of linear transformations; isomorphisms. Linear transformations and matrices: transformation of a matrix; matrix of a transformation; base change and similar matrices.

lastnosti; karakteristični polinom; diagonalizacija. Prostori s skalarnim produktom: Evklidski prostori; unitarni prostori; pravokotnost in ortogonalne baze. Grupe in podgrupe. Osnovni pojmi in primeri. Red elementa, ciklična grupa. Kolobarji, obsegi in polja: osnovni pojmi in primeri.	Eigenvalueas and eigenvectors: basic properties; characteristic polynomial; diagonalization. Spaces with inner product: Euclidean spaces; unitary spaces; orthogonality and orthogonal bases. Groups and subgroups. Basic concepts and examples. Order of an element, cyclic. Rings, division rings and fields: basic concepts and examples.

Temeljni literatura in viri / Readings:

M. Dobovišek, D. Kobal, B. Magajna, Naloge iz algebre I, DMFA založništvo, Ljubljana, 2005.
W. Y. Gilbert, W. K. Nicholson, Modern Algebra with Applications, Wiley, Chichester 2004.
R. Kaye, R. Wilson, Linear Algebra, Oxford University Press, Oxford, 1998.
M. Kolar, B. Zgrablič, Več kot nobena, a manj kot tisoč in ena rešena naloga iz linearne algebre, Pedagoška fakulteta Ljubljana, Ljubljana, 1996.
S. Lang, Undergraduate Algebra, Springer, 2005.
I. Vidav, Algebra, DMFA, Ljubljana 1980.

Cilji in kompetence:	**Objectives and competences:**
Spoznati osnovne algebraične strukture s poudarkom na vektorskih prostorih in linearnih preslikavah.	To know basic algebraic structures with a special emphasize on vector spaces and linear transformations.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • Razumevanje vektorskih prostorov in linearnih transformacij. • Poznavanje grup, kolbarjev in obsegov. • Povezovanje teorije s predmetov »Matrični račun«. Prenesljive/ključne spretnosti in drugi atributi: • Pridobljena znanja so podlaga za večino predmetov v nadaljevanju študija.	Knowledge and Understanding: • Be able to understand vector spaces and linear transformations. • To know groups, rings and fields. • Be able to connect the theory with the subject »Matrix Calculus«. Transferable/Key Skills and other attributes: • The obtained knowledge is a basis for most of the later subjects.
Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Seminarske vaje • Individualno delo	• Lectures • Tutorial • Individual work
Načini ocenjevanja:	**Assessment:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt) Pisni test – praktični del Izpit (ustni) – teoretični del Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno. Pozitivna ocena pri pisnem testu je pogoj za pristop k izpitu.	Delež (v %) / Weight (in %) 50% 50%	Type (examination, oral, coursework, project): Written test – practical part Exam (oral) – theoretical part Each of the mentioned commitments must be assessed with a passing grade. Passing grade of the written test is required for taking the exam.
Reference nosilca / Lecturer's references:		

1. PAGON, Dušan, REPOVŠ, Dušan, ZAICEV, Mikhail. On the codimension growth of simple color Lie superalgebras. *J. Lie theory*, 2012, vol. 22, no. 2, str. 465-479. http://www.heldermann.de/JLT/JLT22/JLT222/jlt22017.htm. [COBISS.SI-ID 16070233]

2. PAGON, Dušan. Simplified square equation in the quaternion algebra. *International journal of pure and applied mathematics*, 2010, vol. 61, no. 2, str. 231-240. [COBISS.SI-ID 17718024]

3. GUTIK, Oleg, PAGON, Dušan, REPOVŠ, Dušan. On chains in H-closed topological pospaces. *Order (Dordr.)*, 2010, vol. 27, no. 1, str. 69-81. http://dx.doi.org/10.1007/s11083-010-9140-x. [COBISS.SI-ID 15502169]

4. GUTIK, Oleg, PAGON, Dušan, REPOVŠ, Dušan. The continuity of the inversion and the structure of maximal subgroups in countably compact topological semigroups. *Acta math. Hung.*, 2009, vol. 124, no. 3, str. 201-214. http://dx.doi.org/10.1007/s10474-009-8144-8, doi: 10.1007/s10474-009-8144-8. [COBISS.SI-ID 15212121]

5. PAGON, Dušan. The dynamics of selfsimilar sets generated by multibranching trees. *International journal of computational and numerical analysis and applications*, 2004, vol. 6, no. 1, str. 65-76. [COBISS.SI-ID 14037081]