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	Obvezni / Obligatory
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:**
Ne	None
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 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.	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. 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:

Spoznati osnovne algebraične strukture s poudarkom na vektorskih prostorih in linearnih preslikavah.

Objectives and competences:

To know basic algebraic structures with a special emphasize on vector spaces and linear transformations.

Predvideni študijski rezultati:

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.

Intended learning outcomes:

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:

- Predavanja
- Seminarske vaje
- Individualno delo

Learning and teaching methods:

- Lectures
- Tutorial
- Individual work

Načini ocenjevanja:

Način (pisni izpit, izpraševanje, naloge, projekt)	Delež (v %) / Weight (in %)	Type (examination, oral, coursework, project):
Pisni izpit – praktični del Ustni izpit – teoretični del	50% 50%	Written exam – practical part Oral exam – theoretical part
Pisni izpit – praktični del se lahko nadomesti z dvema delnima testoma (sprotni obveznosti).		Written exam – practical part can be replaced by two partial tests (mid-term testing).

Assessment:

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]