



Univerza v Mariboru



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Fakulteta za naravoslovje in
matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Linearna algebra
Course title:	Linear Algebra

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika	Splošna matematika	1.	2.
Mathematics	General Mathematics	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
60		60			120	8

Nosilec predmeta / Lecturer:

Daniel Eremita

Jeziki /

Languages:

Predavanja /

Lectures:

Vaje / Tutorial:

SLOVENSKO/SLOVENE

SLOVENSKO/SLOVENE

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

Jih ni.

Prerequisites:

There are none.

Vsebina:

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.

Content (Syllabus outline):

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

Lastne vrednosti in lastni vektorji: osnovne lastnosti; zgornje trikotne matrike; minimalni polinom; karakteristični polinom; Cayley-Hamiltonov izrek; diagonalizacija; Jordanova kanonična forma. Prostori s skalarnim produktom: Evklidski prostori; unitarni prostori; pravokotnost in ortogonalne baze; ortogonalni komplementi; dualni prostor in Rieszov izrek. Preslikave v Evklidskih in unitarnih prostorih: adjungirane; normalne; sebi-adjungirane; ortogonalne in unitarne; pozitivno (semi)definitne. V kolikor bo čas dopuščal, bomo obravnavali še Bilinearne in kvadratne forme: bilinearne forme; predstavitev z matrikami; kvadratne forme in Sylvestrov vztrajnostni zakon.	matrices. Eigenvalues and eigenvectors: basic properties; upper triangular matrices; minimal polynomial; characteristic polynomial; Cayley-Hamilton theorem; diagonalization; Jordan canonical form. Spaces with inner product: Euclidean spaces; unitary spaces; orthogonality and orthogonal bases; orthogonal complement; dual spaces and Riesz theorem. Transformations in Euclidean and unitary spaces: adjoint; normal; self-adjoint; orthogonal and unitary; positive (semi)definite. If time permits, we shall also consider Bilinear and quadratic forms: bilinear forms; representations with matrices; quadratic forms and Sylvester's law of inertia.
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Temeljni literatura in viri / Readings:

T. Košir, Linearna algebra (spletna skripta) http://www.fmf.uni-lj.si/~kosir/poucevanje/0607/linalg.html http://www.fmf.uni-lj.si/~kosir/poucevanje/0809/alg1-fm.html M. Kolar, B. Zgrabič, Več kot nobena, a manj kot tisoč in ena rešena naloga iz linearne algebre, Pedagoška fakulteta Ljubljana, Ljubljana, 1996. C. Scheiderer, Lineare Algebra I und II (spletna skripta) http://www.uni-duisburg.de/FB11/LEHRE/LINALG/LA.public.pdf M. Dobovišek, D. Kobal, B. Magajna, Naloge iz algebre I, DMFA založništvo, Ljubljana, 2005. R. Kaye, R. Wilson, Linear Algebra, Oxford University Press, Oxford, 1998.
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Cilji in kompetence:

Temeljito spoznati vektorske prostore in linearne preslikave.

Objectives and competences:

To know thoroughly vector spaces and linear transformation.

Predvideni študijski rezultati:

Znanje in razumevanje: - Razumevanje vektorskih prostorov in linearnih transformacij. - Povezovanje teorije s predmetov »Vektorji in matrike«. Prenesljive/ključne spretnosti in drugi atributi: - Pridobljena znanja so podlaga za večino

Intended learning outcomes:

Knowledge and Understanding: - Be able to understand vector spaces and linear transformations. - Be able to connect the theory with the subject »Vectors and Matrices«. Transferable/Key Skills and other attributes: - The obtained knowledge is a basis for
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predmetov v nadaljevanju študija.		most of the later subjects.	
Metode poučevanja in učenja:		Learning and teaching methods:	
• Domače naloge • Predavanja • Teoretične vaje		• Homework • Lectures • Theoretical exercises	
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. EREMITA, Daniel, ILIŠEVIĆ, Dijana. On (anti-)multiplicative generalized derivations. <i>Glas. mat.</i>, 2012, vol. 47, no. 1, str. 105-118. http://dx.doi.org/10.3336/gm.47.1.08. [COBISS.SI-ID 16341849] 2. BENKOVIČ, Dominik, EREMITA, Daniel. Multiplicative Lie n-derivations of triangular rings. <i>Linear algebra appl.</i>. [Print ed.], 2012, vol. 436, iss 11, str. 4223-4240. http://dx.doi.org/10.1016/j.laa.2012.01.022. [COBISS.SI-ID 16278361] 3. BENKOVIČ, Dominik, EREMITA, Daniel, VUKMAN, Joso. A characterization of the centroid of a prime ring. <i>Stud. sci. math. Hung. (Print)</i>, 2008, vol. 45, no. 3, str. 379-394. http://dx.doi.org/10.1556/SScMath.2008.1069, doi: 10.1556/SScMath.2008.1069. [COBISS.SI-ID 16236040] 4. EREMITA, Daniel, ILIŠEVIĆ, Dijana. On additivity of centralisers. <i>Bull. Aust. Math. Soc.</i>, 2006, 74, str. 177-184. [COBISS.SI-ID 14915336] 5. VUKMAN, Joso, KOSI-ULBL, Irena, EREMITA, Daniel. On certain equations in rings. <i>Bull. Aust. Math. Soc.</i>, 2005, vol. 71, str. 53-60. [COBISS.SI-ID 13721096]			