



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Vektorji in matrike
Course title:	Vectors and Matrices

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika		1.	1.
Mathematics		1 st	1 st

Vrsta predmeta / Course type

obvezni/compulsory

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		45			150	8

Nosilec predmeta / Lecturer:

Daniel Eremita

Jeziki /

Languages:

Predavanja /

Lectures:

SLOVENSKO/SLOVENE

Vaje / Tutorial:

SLOVENSKO/SLOVENE

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

Vsaka izmed naštetih obveznosti v načinih ocenjevanja mora biti opravljena s pozitivno oceno.

Pozitivna ocena pri pisnem izpitu je pogoj za pristop k ustnemu izpitu.

Vsebina:

Vektorji v ravnini in prostoru, linearne kombinacije, kolinearnost in koplanarnost. Linearna neodvisnost vektorjev, baza in dimenzija prostora. Koordinate vektorja, zamenjava baze.

Skalarni produkt vektorjev, ortonormirana baza prostora in pravokotni koordinatni

Prerequisites:

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

Passing grade of written exam is required to take the oral exam.

Content (Syllabus outline):

Vectors on the plane and in the space, linear combinations, colinearity and coplanarity. Linear independency of vectors, the basis and the dimension of a space. Coordinates of a vector, the change of basis.

Inner product of vectors, an orthonormal basis of the space, a rectangular coordinate system.

sistem. Vektorski in mešani produkt vektorjev, ploščina paralelograma, prostornina prizme. Enačba premice v ravnini, medsebojna lega premic. Razdalja med točko in premico, kot med dvema premicama. Premice in ravnine v prostoru, koordinatni zapis in medsebojna lega. Matrike. Seštevanje matrik in množenje s skalarji. Transponirana matrika. Rang matrike. Množenje matrik, inverzna matrika. Linearna enačba. Sistemi linearnih enačb in njihov matrični zapis. Množici rešitev homogenega in nehomogenega sistema linearnih enačb. Gaussova eliminacijska metoda. Elementarne transformacije nad vrsticami matrike in elementarne matrike. Determinanta kvadratne matrike in njene značilne lastnosti. Determinanta produkta matrik. Obrazec za inverzno matriko in rešitev kvadratnega sistema linearnih enačb.	Cross product of vectors and mixed product, the area of a parallelogram and the volume of a prism. Equation of a line in the plane, the interrelation of lines. The distance between a point and a line, the angle between two lines. Lines and planes in the space, their equations and interrelations. Matrices. Matrix addition and scalar multiplication. The transpose matrix. Rank of a matrix. Matrix multiplication, the inverse matrix. Linear equation. Systems of linear equations and their matrix form. The sets of solutions of a homogeneous and a non-homogeneous system of linear equations. The Gauss elimination method. Elementary transformations of matrix rows and elementary matrices. Determinant of a square matrix, characteristic properties. The determinant of a product. Formula for an inverse matrix and for solutions of a square system of linear equations.
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Temeljni literatura in viri / Readings:

D. Benkovič, *Vektorji in matrike*, Fakulteta za naravoslovje in matematiko, Maribor 2014.
D. Benkovič, *Algebra I: zbrano gradivo*, Fakulteta za naravoslovje in matematiko, Maribor 2010.
J. Grasselli, *Linearna algebra*, DMFA založništvo. Ljubljana, 1994 (tudi kot ustrezno poglavje v knjigi I. Vidav: *Višja matematika III*, 1981)
T. S. Blyth, E. F. Robertson, *Basic linear algebra*, Springer-Verlag, Berlin, Heidelberg, New York, 1998.
S. Lange, *Introduction to linear algebra*, Springer-Verlag, New York 1993.

Dodatna literatura / Additional Readings:

F.E. Hohn, *Elementary Matrix Algebra*, 3rd Edition, Dover Publications, 2013.
M. Kolar, B. Zgrablić, *Več kot nobena, a manj kot tisoč in ena rešena naloga iz linearne algebre*, 4. natis, Pedagoška fakulteta, Ljubljana 2004.
B. Orel, *Linearna algebra*, Fakulteta za računalništvo in informatiko, Ljubljana 2020

Cilji in kompetence:

Objectives and competences:

Študent obvlada osnove vektorskega in matričnega računa.

The students get familiar with the basic concepts of vector and matrix computations.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Razumevanje geometrijskih vektorjev in sposobnost posplošitve osnovnih konceptov na več dimenzij.
- Poznavanje matričnega računa in njegove uporabe na različnih področjih.

Prenesljive/ključne spretnosti in drugi atributi:

- Pridobljena znanja so podlaga za večino predmetov v nadaljevanju študija.

Intended learning outcomes:

Knowledge and Understanding:

- To understand geometric vectors and be able to generalize the main concepts in higher dimensions
- To know matrix computations and be able to apply them in various fields.

Transferable/Key Skills and other attributes:

- The obtained knowledge is a basis for most of the later subjects.

Metode poučevanja in učenja:

- Predavanja
- Teoretične vaje

Learning and teaching methods:

- Lectures
- Theoretical exercises

Načini ocenjevanja:

Assessment:

Pisni izpit
Ustni izpit

Delež (v %) /
Weight (in %)

Written exam
Oral exam

50%
50%

Opombe:

Pisni izpit se lahko nadomesti s kolokviji v enakem deležu 50%.

Comments:

Written exam can be replaced by written midterm examination in the weight of 50%.

Reference nosilca / Lecturer's references:

1. EREMITA, Daniel. Biderivations and commuting linear maps on current Lie algebras. *Journal of Lie theory*. 2021, vol. 31, no. 1, str. 119-126. ISSN 0949-5932. [COBISS.SI-ID [100444419](#)]
2. BENKOVIČ, Dominik, EREMITA, Daniel. Generalized derivations of current Lie algebras. *Communications in algebra*. 2024, vol. 52, iss. 11, str. 4603-4611. ISSN 0092-7872. [COBISS.SI-ID [200554755](#)]
3. EREMITA, Daniel. Dhara, B. (6-BELDC-M); Ghosh, S. (6-JDVP); Sandhu, G. S. (6-PMNC-M): On Lie ideals satisfying certain differential identities in prime rings. (English summary). - Extracta Math. 38 (2023), no. 1, 67–84. *MathSciNet : Mathematical Reviews on the Web*. [Spletna izd.]. 2024, 1 spletni vir (mr4608757). ISSN 2167-5163. [COBISS.SI-ID [200562435](#)]

4. EREMITA, Daniel. Krempa, Jan (PL-WASW-IM): On nil algebras and a problem of Passman concerning nilpotent free algebras. (English summary). - Algebra and coding theory, 197-204, Contemp. Math., 785, Amer. Math. Soc., [Providence], RI, [2023], ©2023. *MathSciNet : Mathematical Reviews on the Web*. [Spletna izd.]. 2024, 1 spletni vir (mr4586441). ISSN 2167-5163. [COBISS.SI-ID [215992579](#)]
5. EREMITA, Daniel. Tiwari, S. K. (6-IITPT-DM): Product and commuting generalized derivations in prime rings. (English summary). - Rend. Circ. Mat. Palermo (2) 72 (2023), no. 2, 1377–1397. *MathSciNet : Mathematical Reviews on the Web*. [Spletna izd.]. 2024, 1 spletni vir (mr4559105). ISSN 2167-5163. [COBISS.SI-ID [200564227](#)]