# GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

| Subject name and code | Linear Algebra, PG_00021032 | | |
|---|---|---|---|
| Field of study | Mathematics | | |
| Date of commencement of studies | October 2023 | Academic year of realisation of subject | 2023/2024 |
| Education level | first-cycle studies | Subject group | Obligatory subject group in the field of study |
| | | | Subject group related to scientific research in the field of study |
| Mode of study | Full-time studies | Mode of delivery | at the university |
| Year of study | 1 | Language of instruction | Polish |
| Semester of study | 2 | ECTS credits | 5.0 |
| Learning profile | general academic profile | Assessment form | exam |
| Conducting unit | Department of Nonlinear Analysis and Statistics -> Faculty of Applied Physics and Mathematics | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr Joanna Cyman | |
| | Teachers | dr Joanna Cyman | |
| | | dr Maryna Shcholokova | |

| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|---|
| | Number of study hours | 30.0 | 30.0 | 0.0 | 0.0 | 0.0 | 60 |
| | E-learning hours included: 0.0 | | | | | | |
| | Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36758 Adresy na platformie eNauczanie: Algebra liniowa II 2023/2024 - Moodle ID: 36758 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36758 | | | | | | |

| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | Self-study | SUM |
|---|---|---|---|---|---|
| | Number of study hours | 60 | 5.0 | 60.0 | 125 |

| Subject objectives | Learning of elements of linear algebra |
|---|---|

| Learning outcomes | Course outcome | Subject outcome | Method of verification |
|---|---|---|---|
| | K6_W07 | linear properties in calculus and other parts of mathematics | [SW1] Assessment of factual knowledge |
| | K6_U08 | complex numbers, determinants, matrices, eigenvalues | [SU4] Assessment of ability to use methods and tools |
| | K6_U03 | proper use of algebraic objects | [SU3] Assessment of ability to use knowledge gained from the subject |
| | K6_U01 | proving simple properties of matrices, linear independence or orthogonality of vectors | [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools |
| | K6_W02 | formulates and proves basic theorems | [SW1] Assessment of factual knowledge |

| Subject contents | **Vector space**. Basis and dimension of vector space. Coordinates of a vector in the vector space basis. The change-of-basis matrix. |
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| | **Linear maps**. Kernel and image. Matrix of a linear map. Operations on maps. |
| | **Euclidean spaces**. Scalar product, orthogonality of vectors, orthogonal and orthonormal basis. GramSchmidt process. |
| | **Eigenvalues and eigenvectors.** Eigenvalues and eigenvectors of matrices and mappings. Cayley-Hamilton theorem. |
| | **Quadratic form.** Real quadratic form. Quadratic form in canonical form. |

| Prerequisites and co-requisites | linear algebra I |
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| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| --- | --- | --- | --- |
| | colloquia | 50.0% | 50.0% |
| | exam | 50.0% | 40.0% |
| | activity | 0.0% | 10.0% |

| Recommended reading | Basic literature | T. Jurlewicz, Z. Skoczylas, Linear Algebra 1 and 2. Definitions, theorems, formulas, Oficyna Wydawnicza GiS, Wrocław 2012. |
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| | | T. Jurlewicz, Z. Skoczylas, Linear Algebra 1 and 2. Examples and tasks, Oficyna Wydawnicza GiS, Wrocław 2012. |
| | | J. Topp, Linear algebra, University of Gdańsk Publishing House, Gdańsk 2015. |
| | Supplementary literature | |
| | | A. Romanowski, Linear algebra, Ed. PG 2003. |
| | | J. Rutkowski, Linear algebra in tasks, PWN 2008 |
| | | G. Banaszak, W. Gajda, Elements of linear algebra, WNT 2002. |
| | eResources addresses | Podstawowe https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36758 - Algebra liniowa II 2023/2024 - Moodle ID: 36758 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36758 |

| Example issues/ example questions/ tasks being completed | Find eigenvalues and diagonal form of a given matrix A. |
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| Work placement | Not applicable |