Subject card

| Subject name and code | Linear Algebra, PG_00037109 |  |  |  |  |  |  |
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| Field of study | Economic Analytics |  |  |  |  |  |  |
| Date of commencement of studies | October 2021 |  | Academic year of realisation of subject |  |  | 2021/2022 |  |
| Education level | first-cycle studies |  | Subject group |  |  | Obligatory subject group in the field of study |  |
| Mode of study | Full-time studies |  | Mode of delivery |  |  | blended-learning |  |
| Year of study | 1 |  | Language of instruction |  |  | Polish |  |
| Semester of study | 1 |  | ECTS credits |  |  | 6.0 |  |
| Learning profile | general academic profile |  | Assessment form |  |  | exam |  |
| Conducting unit | Mathematics Center -> Vice-Rector for Education |  |  |  |  |  |  |
| Name and surname of lecturer (lecturers) | Subject supervisor |  | dr inż. Natalia Jarzębkowska |  |  |  |  |
|  | Teachers |  | dr inż. Natalia Jarzębkowska |  |  |  |  |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Proje | Seminar | SUM |
|  | Number of study hours | 30.0 | 30.0 | 0.0 | 0.0 | 0.0 | 60 |
|  | E-learning hours included: 30.0 |  |  |  |  |  |  |
|  | Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18352 Adresy na platformie eNauczanie: <br> WZiE - AG - Algebra linowa 2021/2022 (N.Jarzębkowska) - Moodle ID: 18352 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18352 |  |  |  |  |  |  |
| 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 |  | 14.0 |  | 76.0 | 150 |
| Subject objectives | The aim of this subject is to obtain the students competence in the range of using the basic methods of linear algebra. Furthermore, the student is able to use this knowledge to solve theoretical and practical problems that can be found in the various fields of the economy. |  |  |  |  |  |  |


| Learning outcomes | Course outcome | Subject outcome | Method of verification |
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|  | [K6_W02] Knows how to describe economic phenomena using quantitative methods with the use of IT tools. | Student defines the basic concepts of linear algebra. Student defines basic notions of matrix and vector calculus. <br> Student analyzes problems of analytical geometry. <br> Student knows and understands the concept of complex numbers. Student combines knowledge of mathematics with knowledge from other fields. <br> Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions. | [SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation |
|  | [K6_U08] Has the ability to use mathematical and IT tools to analyse economic phenomena and make decisions by economic entities. | Student applies the basic concepts and rules of matrix calculus. <br> Student determines eigenvalues and eigenvectors of matrices. Student solves systems of linear equations using different methods. Student examines the linear independence of vectors. Student examines the position of lines and planes in space. <br> Student recognizes certain curves and analyzes relations between objects. <br> Student performs calculations on complex numbers. <br> Student uses methods of linear algebra to solve economical problems. | [SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools |
| Subject contents | LECTURES and TUTORIALS: Polynomials. Roots of a polynomial. <br> Matrices. Matrix operations. Determinants and their properties. Linear systems. <br> Gauss method. Reduced echelon form. Gauss-Jordan reduction. Cramer's rule, KroneckerCapelli theorem. Eigenvalues and eigenvectors. <br> Vectors. Vector length and angle. Linear geometry of 3-space. <br> Vector spaces and subspaces. Linear independence. Basis and dimension. Linear maps. Complex numbers. Conics and quadrics. Quadratic forms. Sylvester's criterion. LSM. |  |  |
| Prerequisites and co-requisites | Knowledge of high school mathematics. |  |  |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
|  | Midterm tests | 50.0\% | 30.0\% |
|  | Class activity | 50.0\% | 20.0\% |
|  | Written exam | 50.0\% | 50.0\% |
| Recommended reading | Basic literature | 1. Jurlewicz T., Skoczylas Z., Algebra liniowa 1, 2, Definicje, twierdzenia wzory, Wydawnictwo GiS, Wrocław |  |
|  |  | 2. Jurlewicz T., Skoczylas Z., Algeb Wydawnictwo GiS, Wrocław <br> 3. Jankowska K., Jankowski T., Zbia <br> 4. Gurgul H., Suder M., Matematyk Oficyna a Wolters Kluwer business <br> 5. E-learning platform resources | ra liniowa 1, 2, Przykłady i zadania, <br> ór zadań z matematyki, PG Gdańsk <br> dla kierunków ekonomicznych, Warszawa |



