

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Linear algebra with analytic geometry</b>		Code <b>1010341721010342811</b>
Field of study <b>Mathematics in technology</b>	Profile of study (general academic, practical) <b>general academic</b>	Year /Semester <b>1 / 2</b>
Elective path/specialty <b>-</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>30</b> Classes: <b>30</b> Laboratory: <b>30</b> Project/seminars: <b>-</b>		No. of credits <b>6</b>
Status of the course in the study program (Basic, major, other) <b>other</b>		(university-wide, from another field) <b>university-wide</b>
Education areas and fields of science and art <b>the sciences</b> <b>Mathematical sciences</b>		ECTS distribution (number and %) <b>6 100%</b> <b>6 100%</b>
<b>Responsible for subject / lecturer:</b>  dr hab. inż. Paweł Kolwicz email: pawel.kolwicz@put.poznan.pl tel. 61 665 2802 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Basic knowledge with range of secondary school and of linear algebra and analytic geometry (1 semester of studies)
2	<b>Skills</b>	The skills of applying matrix calculus, solving systems of linear equations, using vector algebra in analytic geometry, applying basic notions of the theory of linear spaces and linear operators.
3	<b>Social competencies</b>	He has consciousness of need of broadening his competences, readiness to undertaking of co-operation.
<b>Assumptions and objectives of the course:</b> To be able to check the determinateness of square form (bilinear). To recognize basic notions of the space with the inner product (in particular the notion of orthogonal basis). To recognize the curves as well as surfaces of second degree. To be aware of chosen elements of differential geometry of curves.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. explain notions of bilinear (quadratic) form, the matrix of form, the notion of inner product, orthogonal basis, curve (surface) of second degree, the osculating circle - [K_W01, K_W03, K_W04, K_W05, K_W08] 2. understand ideas and proofs of more important theorems - [K_W01, K_W03, K_W08]		
<b>Skills:</b> 1. find matrices of quadratic (bilinear) forms, study determinateness of quadratic forms, calculate inner product and norm in the respective space - [[K_U01, K_U09, K_U10, K_U11] 2. apply theorems concerning determining curves and surfaces of second degree, find the equation of osculating circle - [[K_U01, K_U09, K_U11]		
<b>Social competencies:</b> 1. can think and behave in good mathematical manner in the area of linear algebra analytical geometry - [K_K02] 2. knows the limitation of own knowledge and understand the need of more far educatio and the necessity of systematic work - [K_K01, K_K03]		
<b>Assessment methods of study outcomes</b>		

<p>The lecture:                  -written exam concerning mainly the theoretic part of the subject.                  Classes :                  evaluation of written tests and the direct activity during the classes (solving problems and preparing of reports)                  -continuous evaluation during each meeting - taking into account the activity in discussion and in cooperation concerning practical exercises.                  Laboratory:                  -evaluation of the knowledge and skills in the form of written test,                  -continuous evaluation during each meeting.                  Getting extra points related with activity, in partucular:                  -presenting reports concerning applications of theory in different branches or putting the theory in history of mathematics                  -notes concerning the improvement of basic materials;                  -active participation in consultations.</p>	
<b>Course description</b>	
<p>Bilinear and quadratic forms. Spaces with inner product. Algebraic curves and surfaces of second degree. Differential geometry of curves.                  Actualization 2016/2017.                  The applied methods of education:                  -lectures                  1. lecture led in interactive way with questions formulating to group,                  2. the students' activity is taken into account during the final evaluation (the preparation of historical reports connected with the mathematicians' related to material, presenting the proofs leaving to independent making),                  3. in track of lecture initiating the discussion,                  4. theory presented with connections of current knowledge from previous lectures.                  -classes                  1. solving on board example tasks                  2. detailed the reviewing by leader the solutions of tasks of practice and the discussions over comments.                  -laboratories</p>	
<p><b>Basic bibliography:</b>                  1. A. I. Kostrykin, Wstęp do algebry, cz.1 Podstawy algebry, PWN, Warszawa 2004.                  2. A. I. Kostrykin, Wstęp do algebry, cz.2 Algebra liniowa, PWN, Warszawa 2004.                  3. A. I. Kostrykin, Zbiór zadań z algebry, PWN, Warszawa 2005.                  4. M. Grzesiak, Liczby zespolone i algebra liniowa, Poznań 1999.                  5. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1, Wrocław 2003.                  6. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 2, Wrocław 2005.                  7. J. Brzózka, L. Dobroczyński, MATLAB: środowisko obliczeń naukowo-technicznych, PWN, Warszawa 2005.                  8. F. Leja, Geometria analityczna, PWN, Warszawa 1954.</p>	
<p><b>Additional bibliography:</b>                  1. H. Arodź, K. Rościszowski, Zbiór zadań z algebry i geometrii analitycznej dla fizyków, PWN 1990.</p>	
<b>Result of average student's workload</b>	
<b>Activity</b>	<b>Time (working hours)</b>
1. Active participation in meetings (classes)	30
2. Active participation in meetings (lectures)	30
3. Active participation in meetings (laboratory)	30
4. Active participation in consultations with posing questions	10
5. The finishing (own work) of reporting from practices laboratory	5
6. preparing to classes/laboratory	18
7. preparing to tests	10
8. the introduction with indicated literature / the didactic materials (10 sides of scientific text = 1 godz.)	10
9. preparing to exam and attending to the exam	12
<b>Student's workload</b>	

<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	155	6
Contact hours	90	4
Practical activities	65	2