POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mathematics

Course

Field of study	Year/Semester
Engineering Management	1/1
Area of study (specialization)	Profile of study
	general academic
Level of study	Course offered in
First-cycle studies	Polish
Form of study	Requirements
full-time	compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
10		
Tutorials	Projects/seminars	
10		

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

Ph.D., Eng., Mariola Skorupka

Mail to: mariola.skorupka@put.poznan.pl

Faculty of Automatic Control, Robotics and Electrical Engineering

ul. Piotrowo 3A, 61-138 Poznań,

Responsible for the course/lecturer:

Prerequisites

The student should have knowledge of mathematics in the field of high school and basic scope extended by differential calculus (in the scope of extended).

POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

Course objective

Acquainting with problems of linear algebra and learning methods and applications of differential calculus of functions of one and many variables.

Course-related learning outcomes

Knowledge

1. The student has knowledge of numerical sequences. [P6S_WG_04]

2. The student has knowledge of the derivative and how to determine it and how to use it. [P6S_WG_04]

3. The student has knowledge of matrices, methods of elementary operations on matrices, principles of solving systems of linear equations. [P6S_WG_04]

4. The student has knowledge of the calculation of partial derivatives of functions of many variables and the principle of determining the extremes of functions of many variables. [P6S_WG_04]

Skills

1. The student can examine the convergence of numerical sequences and series. [P6S_UO_02, P6S_UW_03]

2. The student is able to determine the derivative of a function of one variable, apply it to the limits of functions (de L'Hospital rule) and study the variability of functions. [P6S_UO_02, P6S_UW_03]

3. The student can perform operations on matrices, determine the inverse matrix of elementary operations methods, calculate the determinant of matrices, solve a system of linear equations using the Gaussian elimination method. [P6S_UO_02, P6S_UW_03]

4. The student is able to determine partial derivatives and local extremes of functions of many variables. [P6S_UO_02, P6S_UW_03]

5. The student is able to obtain the above information from literature and other sources and integrate obtained information, interpret and draw conclusions from them. [P6S_UO_02, P6S_UW_03]

Social competences

1. The student is aware of the level of its knowledge in the field of energy research. [P6S_KO_02]

2. The student is aware of the deepening and expansion of knowledge in order to solve new technical problems. [P6S_KO_02]

3. The student is able to properly set priorities for the implementation of tasks specified by himself or others, including is able to think and act strictly in the area of description of processes in technical and exact sciences. [P6S_KO_02]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1. Lecture: Knowledge acquired during the lecture is verified by a 60 minute pass in the last class.

POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

Assessment threshold: 50% of points obtained from final essay and students' activity in class. Lecture for the grade. Assessment issues based on which questions are developed. They will be sent via e-mail using the university e-mail system.

2. Knowledge acquired during the exercises is verified by two tests carried out during 7 and 14 classes and activity during classes. Each test consists of the same number of points. Passing threshold: 50% of points − the sum of points obtained from tests and activity during classes.

Programme content

Lecture:

STRUCTURES AND NUMBER SERIES: limitation, monotonicity, string boundaries, definition of the number e and its application.

DIFFERENTIAL ACCOUNT OF ONE VARIABLE FUNCTION: derivative of function, extrema of differentiable function, monotonicity intervals, second derivative - convexity, concavity, inflection points, derivatives of higher orders, de L'Hospital rule.

MATRIX ACCOUNT: operations on matrices, concept of inverse matrix - calculation, matrix determinant - properties and methods of determination, systems of linear equations, Kronecker-Capell theorem, solving systems of linear equations by Gauss elimination method.

DIFFERENTIAL ACCOUNT OF MULTIPLE VARIABLE FUNCTIONS: definition of the function of two variables, partial derivative, Schwarz theorems, extremes of the function of two variables.

Exercises:

STRUCTURES AND NUMBER SERIES: limitation, monotonicity, string boundaries, the number e and its application.

DIFFERENTIAL ACCOUNT OF ONE VARIABLE FUNCTION: derivative of function, extrema of differentiable function, monotonicity intervals, second derivative - convexity, concavity, inflection points, derivatives of higher orders, de L'Hospital rule.

MATRIX ACCOUNT: operations on matrices, inverse matrix - calculation, matrix determinant - methods of determination, solving systems of linear equations by Gauss elimination method.

DIFFERENTIAL ACCOUNT OF MULTIPLE VARIABLE FUNCTIONS: definition of the function of two variables, partial derivative, Schwarz theorems, extremes of the function of two variables.

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples on the board. Conducted in an interactive way with the formulation of questions to a group of students. Initiating discussions during the lecture.

POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

2. Exercises: solving tasks given by the teacher on the board along with analyzing the next stages. The method of solving the task by students on the board is reviewed by the tutor. Completed with tasks for independent solution at home.

Bibliography

Basic

1. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, T. 1-2, PWN, Warszawa 2011.

2. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka dla studentów uczelni technicznych, T. 1-3, Wydawnictwo Politechniki Poznańskiej, Poznań 2004.

3. M. Gewert, Z. Skoczylas, Analiza matematyczna 1/Definicje, twierdzenia, wzory/ Oficyna Wydawnicza GiS, Wrocław 2011.

4. M. Gewert, Z. Skoczylas, Analiza matematyczna 1/Przykłady i zadania/ Oficyna Wydawnicza GiS, Wrocław 2011.

Additional

1. W. Stankiewicz, J. Wojtowicz, Zadania z matematyki dla wyższych uczelni technicznych, T. 1-2, PWN, Warszawa 2003.

2. M. Lassek, Matematyka dla studentów technicznych, T. 1-2, Wydawnictwo Wspierania procesu edukacji, Warszawa 2004.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	75	3,0
Student's own work (literature studies, preparation for exercises and lecture, preparation for passing the ezercises and the lecture) [1]	25	1,0

---

[1] delete or add other activities as appropriate