

The Technical University of Košice, Faculty of Mechanical Engineering

Course unit title: **APPLIED MATHEMATICS**
 Course code: **23005869**
 Study programme: **Mechanical Engineering**

Study period: **1st year, ST 2024/2025**
 Faculty: **Faculty of Mechanical Engineering**
 Level of study: **Master**
 Form of study: **Full time**
 Evaluation: **Course credit, Exam**
 Number of credits: **6**

Guaranteeing department: **DEPARTMENT OF APPLIED MATHEMATICS AND INFORMATICS**
 Guarantor: **doc. RNDr. Miriam ANDREJIOVÁ, PhD.**

Week	Lectures Number of hours: 3 per week	Tutorials Number of hours: 2 per week
1.	Complex numbers.	Complex numbers.
2.	Elementary linear algebra.	Matrices, determinants, inverse of a matrix.
3.	System of linear equations.	Direct methods for solving systems of linear equations.
4.	Iterative methods for solving system of linear equations.	Iterative methods for solving system of linear equations.
5.	Eigenvalues and eigenvectors.	Eigenvalues and eigenvectors.
6.	General description of operations research. Introduction to linear programming.	Linear programming models.
7.	Methods of solving linear programming problems.	Graphical approach to solving linear programming models.
8.	Simplex method, simplex tableau, standard simplex method.	Simplex method, simplex tableau, standard simplex method.
9.	Special cases of linear programming problems.	<i>Mid-term test.</i>
10.	Ordinary differential equations. Initial value problems. Boundary value problems.	Special cases of linear programming problems. Solving linear programming problems using Excel.
11.	Boundary value problems of higher order differential equations.	Boundary value problems of higher order differential equations.
12.	Calculus of variations.	Variational problems.
13.	Applications of variational problems.	Applications of variational problems.

Recommended reading:

1. Bača, M., Feňovčíková, A.: Mathematics 1, C-PRESS, Košice, 2010.
2. Bača, M., Feňovčíková, A.: Mathematics 2, C-PRESS, Košice, 2010.
3. Burden, R. L., Faires, J. D.: Numerical Methods, Brooks/Cole, Boston, 2012.
4. Downing, D.: Calculus, Barron's Educational Series, Inc., New York, 2006.
5. Elsgolc, L. E.: Calculus of Variations, Dover Publications, Mineola, New York, 2007.
6. Chapra, S., Camale, R.: Numerical Methods for Engineers, McGraw-Hill, 2010.
7. Vanderbei, R. J.: Linear programming: Foundation and Extensions, 4th edition, English, 2013.

Evaluation:**CONTINUOUS EVALUATION**

Mid-term test: **20 points**

C o u r s e c r e d i t: **total points 20 (required minimum 11)**

The necessary condition for obtaining a course credit is to write down homework assignments.

FINAL EVALUATION – EXAM

Computational part: **50 points**

Theoretical part: **30 points**

T o t a l: **total points 80 (required minimum 41)**

Attendance of lectures and classes is compulsory.

Košice, 6th February, 2025

Signature of guarantee

You can find these information on webpage

<http://www.sjf.tuke.sk/kamai/vyucba/predmety-v-letnom-semestri/sjf-ls>