Engineering Mathematics 3 **Course Syllabus**
Course Code: MSB295AN Time: L Monday 11:15-12:00
Semester: Autumn 2022/2023 1. P Monday 12:00-14:00
Location: PTE MIK A-117

General Information:

Name of Course: # ENGINEERING MATHEMATICS3

Course Code: MSB295ANVM
Semester: 1nd
Number of Credits: 5
Allotment of Hours per Week: 1 lecture, 2 practices
Evaluation: Mid-semester grade
Prerequisites: -
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Introduction, Learning Outcomes
The presentations give some elements of important mathematical techniques which is used in electrical engineering practice.
Upon completion of this course, the student should be able to: **interpret,** and **put it into practice**

- **a.** First- and second-order ordinary differential equations,
- **b.** Laplace and inverse Laplace transform
- **c.** linear algebra,
- **d.** Fourier series

General Course Description and Main Content:
Brief Syllabus: This lecture and practical based course aim to give electrical engineering students a solid mathematics basis by covering the following topics:

- ODE
  classification, types of solution, the analytical solution of the first order, separable and linear differential equations, solution of incomplete and linear, second-order ODE, Euler numerical method for a first and second-order differential equation, Laplace transform for linear ODE.
- Linear algebra
  Solution of linear equation system: Cramer's rule, Gauss-Jordan elimination, change of basis method. Eigenvector, eigenvalue
- Fourier series

Students learn the basics of mathematics enabling them to interpret and understand engineering sciences and through solving elementary tasks they deepen their basic theoretical knowledge in the field of engineering. The practical sessions are designed to complement the requirements of different specializations.

Methodology:
The presentations give an introduction to important mathematical techniques of exercise solving and the basic theory of calculus. Equal emphasis is given to learning new mathematics and to learning how to construct and write down correct mathematical arguments. During the course, students learn to apply computer algebra for numerical, symbolical solutions and visualization of the programs.

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Schedule:

The study period has 15 weeks: September 5 - December 16 (2022)

1. Introduction to ODE. First-order separable differential equations
2. First-order linear ODE, numerical solution: Euler method
3. Second-order, incomplete ODE
4. Second-order, linear, homogenous, and inhomogeneous differential equations with constant coefficients
5. Euler numerical method for second-order ODE. Laplace transformation.
6. Inverse Laplace transform, solution of ODE using Laplace transformation. **Homework1**
7. **Mid-term test 1**
8. Matrices and matrix operations. Determinant. Adjoint and inverse of a matrix
9. *No class Autumn holiday*
10. Solution of linear equation system: Cramer's rule, Gauss-Jordan elimination
11. Vector space, linear combination, linearly independent and dependent set.
12. Elementary change of basis, solving linear equation system using change of basis.
13. Eigenvalue, eigenvector. First-order, linear, homogenous differential equation systems.
14. Fourier series. **Homework2**
15. **Mid-term test 2**

Correction period: Dec 19-23 (2022) and Jan 4 (2023)

Attendance:

Attending is required for all classes, and will impact the grade (max. 10%). Unexcused absences will adversely affect the grade, and in case of absence from more than 30% of the total number of the lesson will be grounds for failing the class. To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency, the student must present a valid excuse, such as a doctor's note.

Grading will follow the course structure with the following weight:

1. Class participation, class activity 5 %
2. Homework 5 %.
3. Test 90 %
4. Offered exam grade: over 55 % during the study and correction period.
5. Written exam in the exam period. A minimum of 55% is required to pass the exam.

Final grading scale

Numeric Grade:	**excellent (5)**	**good (4)**	**satisfactory (3)**	**pass (2)**	**fail (1)**
Evaluation in points:	[85%,100%]	[70%,85%)	[55%,70%)	[40%,55%)	[0%,40%)

Students with special needs:

Students with special physical needs and requiring special assistance must first register with the Dean of the Students Office. All reasonable requests to provide an equal learning environment for all students are to be assured.

Required Reading and other Materials will be equivalent to:

George B. Thomas, Jr.: Thomas' Calculus, Pearson Addison Wesley, 2005.
Howard Anton, Chris Rorres: Elementarí Linear Algebra, Wiley, 2014
https://www.khanacademy.org/math/integral-calculus
https://www.khanacademy.org/math/differential-equations
https://www.khanacademy.org/math/multivariable-calculus