Name: Applied Mathematics (Master Degree)	***Neptun-code:*** BMXAME1MNE	***Number of periods/week (lec/sem/lab)*** regular: 3/3/0
Credit points: 8 ***Requirement (assessment method)***: midterm tests signature and exam, (Matlab project work)		***Prerequisite***: –
Lecturer: Dr. László HANKA PhD	***Position***: Associate professor	***Faculty and Institute name***: Bánki Donát Faculty of Mechanical and Safety Engineering, Institute of Mechatronics and Vehicle Engineering

Course Description

Week 1. First order and higher order ordinary differential equations
Week 2. Matrix algebra, systems of linear equations, LU decomposition
Week 3. Eigentheory, applications, diagonalization, powers of matrices, Markov-chain
Week 4. Singular value decomposition of a matrix, Moore-Penrose inverse
Week 5. Linear systems of ordinary differential equations with constant coefficients
Week 6. Description of phase plane, applications
Week 7. Euler's method, Runge-Kutta methods
Week 8. Laplace-transform and it's applications. Convolution theorem, transfer function
Week 9. LTI systems, discrete and continuous signals, Convolution
Week 10. Real and Complex Fourier-Series,
Week 11. Fourier-transform, Z-transform
Week 12. Approximation, least squares method, best fit curves
Week 13. Interpolation methods (Lagrange, Hermite, Spline)
Week 14. MatLab, Simulink and applications

***Reqirements*:**

1. Midterm tests:

Week 7. midterm test 1, (25 points)
Week 13. midterm test 2, (25 points)
Week 14. improvement, and make up of missed midterm tests
Midterm tests are written tests, mathematical problems must be solved (practice and not theory!).

2. Signature: Taking both test is mandatory! If someone achieves 25 points, he/she gets the signature. If not, he/she can take exam for signature on the first week of exam period.

3. Exam: Written test (50 points) in exam period.
(in case of "online exam period" a Matlab project work (25 points) will be the requirement and offered exam mark will be applied!!!) Prerequisite for the exam is the signature.
Midterm test results are included in the exam mark.

<u>Evaluation of exam mark</u>:
0 – 49 % fail (1)
50 - 62 % pass (2)
63 – 75 % satisfactory (3)
76 – 87 % good (4)
88 - 100 % excellent (5)

Literature: on "siva" server: lots of textbooks and problem books can be found there which is related to the curriculum

Recommended:

1. C._Henry_Edwards,_David_E._Penney_Elementary_Differential_Equations; Prentice Hall, NJ 07458, 2008.
2. Strang: Linear algebra and its applications, Brooks/Cole,USA, 1998
3. Schiff: Laplace transform and applications; Springer
4. Thomas_Weir_Hass: Thomas calculus, Pearson, 2012
5. Mathews_Howell: Complex analysis for mathematics and engineering, Jones and Bartlett, 1996

Additional:

6. Paul Blanchard, Robert L. Devaney, Glen R. Hall: Differential Equations; Brooks & Cole, 2012.
7. Kuttler: Elementray linear algebra, Saylor, 2012
8. Boyce_DiPrima: Elementary differetial equations and boudary value problems, Wiley@Sons 2001. etc.

Budapest, 15. June, 2022.

Dr. Laszlo Hanka PhD
lecturer