

Requirements. Mathematics EP1 (BMETE90AX33)

Lecturer: *Dr. Peter Moson* (www.math.bme.hu, +3614632690, +36309329626). Office: H. building 41. Office hours: face-to-face: H. 41. Wednesday 10:30-11:30 a.m.

Method of education. Face to face.

Detailed program (planned):

Week 1. Numbers (natural, integer, rational, real, complex) numbers. Real numbers, axioms. Operations with complex numbers. / Vectors. Vector algebra, dot product (planar, spatial cases).

Week 2. Matrices. Sum, product. Determinants. Linear systems. Rang of matrices. Cross product of vectors.

Week 3. Elementary functions of 1 real variable. Definition of derivative of functions of 1 real variable. Power series. Development of elementary functions into Maclaurin series.

Week 4. Derivation rules. Table of derivatives. Applications of derivation. Tangent lines. Maximum, minimum.

Week 5. Conditions for roots, maximum-minimum, inflection points. L'Hospital's rule. Asymptotes. Sketching the graphs of functions.

Week 6. Sample Test 1. / Test 1.

Week 7. Indefinite integral. Definition, elementary methods. / Retake 1.

Week 8. Indefinite integral (rational expressions, substitution). Definite integral. Definition. Newton-Leibniz formula. Rules of definite integration.

Week 9. Definite integration by parts, by substitution. Applications of integration (area).

Week 10. Applications of integration (volume, center of gravity, etc.). Development of elementary functions into Maclaurin series.

Week 11. Calculation of values, limits and integrals of functions by power series. / Application of integration (separable differential equations of the 1st order).

Week 12. Sample Test 2.

Week 13. Test 2. / Application of integration (linear differential equations of the 1st order).

Week 14. Retake 2. / Summary.

(4 hours/4 credits)

Literature: **Thomas' Calculus** by Thomas, G.B. et al. Several editions, e.g. Addison-Wesley, 2005. (ISBN0321185587)

Up-to-date information (sample tests, exams, summary of the lectures, etc.):

TEAMS and / or homepage (see e.g., Google: Moson Peter, or direct address:

<http://tutor.nok.bme.hu/sandwich/general/moremoson/mo.htm>).

Grading system:

There will be 2 mid-term tests and an exam. The mark will be calculated: 2*20% from the tests and 60% from the exam. The planned dates of the midterm tests: October 15 (Friday), December 1 (Wednesday), 2021. The rooms will be announced later.

For the *signature* the minimal score of the midterm tests is 6-6%. Retake 1: October 22, Retake 2: December 8, 2021. The last possibility to obtain the signature will be in the week right after the semester (for extra fee, registration in Neptun necessary): Dec 14, 2021. No exam without signature.

Written exam. 60%= 10% theory + 50% exercises (this part is open book, if the education is face to face). Dates: January 4, 11, 18, 2022.

Final marks (sum of midterm tests and written exam): 0-39 fail (1), 40-54 pass (2), 55-69 satisfactory (3), 70- ... good (4). If the sum is greater than 78% then the student can take part at an oral exam for the mark excellent (5).

Good Luck, Have a Nice Semester!