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| ÓBUDA UNIVERSITY Rejtő Sándor Faculty of Light Industry and Environmental Engineering | **Environmental Engineering** |
| **Hungarian title of the course: Matematika II.**  **Credit: 6****English title of the course: Mathematics II** |
| **Study field: environmental engineering, industrial product and form design** |
| **Prof. Dr. Galántai Aurél** | **Lecture:****Baranyai István** |  |  **Neptun code:** **RKXMA2EBNE**  |
|  | **Required preliminary knowledge: Mathematics I RKMA1EBNE** |
| Weekly teaching hours:  | Lecturer: 2 | Practical work: 2 | **Language of course: English** |  |
| Exam type: | written exam  |
| **Abstract:** |
| Solution of systems of linear equatiions by Gaussian elimination. An overview of the most important ordinary differential equations and their solution methods. Building up the concept of convergence, differential and integral calculus of multivariate functions. Questions concerning smooth curves and surfaces, vector analysis. A survey of the basic concepts in combinatorics, probability and mathematical statistics.. |
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| DATE | **Detailed schedule of the course**: |
| 1. **hét**

II.18. | Systems of linearequations. Gauss--Jordan elimination. Rank of a matrix. |
| 1. **hét**

**II.25.** | matrix equations |
| **3.hét**III.04. | First order differential equations. General and particular solutions. Separable differential equations. First-order linear differential equations. *.* |
| **4.hét**III.11. | Second-order linear differential equations with constant coefficients. Damped and harmonic oscillations. |
| **5.hét**III.18. | Open, closed and bounded sets of euclidean spaces. Convergence of point sequences. Limits and continuity of multivariate functions. The n-dimensional space. Multivariate functions (scalarfields), vectorfields. Partial derivatives, gradient. The chain rule in several variables. Partial derivatives of order 2, Young theorem, Smooth curves, velocity field. Derivativein a direction. Total differentiability. Smooth surfaces, tangent plane, normal line |
| **6.hét**III.25. | Solution of Problems of CAT 1*.* |
|  **7. hét**IV.01. | *CAT 1**.* |
|  8.hétIV.08. | Hesse-determinant. Extrema of functions of two variables. Area and volume integral, calculation of volumes. |
|  **9.hét**IV.15. | Line and surface integrals. Jacobi matrix. Divergence, curl. Vector field without sources and whirls. Scalar and vector potential. Stokes-type theorems |
| **10.hét**IV.16. | Event algebras, probability fields. Geometrical probability. Conditional probability. The full probability theorem. Sampling with replacement and without replacement. |
| **11.hét**IV.29. | Random variables of discrete and continuousdistributions. Expectations, standard deviations. Binomial and hypergeometrical distributions, sampling. Exponential and normal distributions. |
| **12.hét**V.06. | Statistical samples. Sample average, empirical deviations. The equation of the regression line. |
| **13.hét**V.13. | *CAT 2.* |
| **14.hét**V.20. | Solution of Problems of CAT 2Retake for signature |
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| No | Date | Practical work: |
| 1. | II.18. | Solvability of linear systems by elimination... |
| 2 | II.25 | matrix equations |
| 3. | III.04. | Initial problems for Separable Differential Equations and First Order Linear equations |
| 4. | III.11. | Initial problems for 2nd-order linear equations with constant coefficients |
| 5. | III.18. | Partialderivatives, derivatives in a given direction. Tangent plane and Normal line. |
| 6. | III.25. | Preparation for CAT 1(Solution of Problems). |
| 7. | IV.1. | Extrema of function of two variables.  |
| 8. | III.08. | Area integral. |
| 9. | IV.15.  | Divergence, curl. Line integral, potential function.  |
| 10. | IV.16. | Line integral, potential function. |
| 11. | IV.29. | Sampling with and without replacement. |
| 12. | V.06. | Basic properties of cumulative distibution function and probability densities. |
| 13. | IV.13. | Preparation of CAT 2(Solution of Problems)  |
| 14. | V.20. | Sample average, empirical deviation, linear correlation coefficient. Regression line. Retake Exercises. |

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| **Attendance at lectures:** |
| **The rules of education and exam directory (TVSZ) are the guidelines.**  |
| Exams and tests (types, data) written written Test #1 (week #6), Test #2(week #13).Exams and tests (types, data) written CAT1 written CAT2**Requirements for qualification**: Signature can be obtained if the sum of the points obtained in the two test is at least 40 % of the total of points. In the opposite case a supplementary test from the material of the two tests on week #14, and (if required) one more possibility at the beginning of the exam session, with similar percents.You can miss the exercises a maximum of 3 times. A student who does not show up for at least 4 exercises will be suspended, which cannot be replaced.  |
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| **Literature** |
| Thomas, G.B. et al.: Thomas’ Calculus, 11e, Addison-Wesley, 2005, ISBN: 0-321-18558-7 |
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| **Others:** |
| MOODLE  |
| **Quality Management:**The structure of the course is harmonized with other lecturers from the university. Assessment of students is carried out at every lecture, and at the end of semester. The PDF files are continuously renewed according to the new literature data. |

Date: 2025. February 01.

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lecturer: Baranyai István Intézet Igazgató: Bodáné Dr.Kendrovics Rita