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| **ÓbudaUniversity** | | | | | | | | | | | | | | | | | | |
| **RejtőSándor Faculty of LightIndustry and Environmental Engineering** | | | | | | | | | *Faculty* | | **Environmental Engineering and Natural Sciences** | | | | | | | *Institute* |
| *Hungarian title of the course:* | | | | | | **Matematika II.** | | | | | | | | *Neptun code:* | | RKXMA2EBNE | | |
| *English title of the course:* | | | | | | **Mathematics II** | | | | | | | | *Credit:* | | **6** | | |
| *Type (compulsory/obligatory:)* | | | | | **obligatory** | | | *Education Type* | | | **full-time** | *Semester :* | | | | | **2** | |
| *Study field:* | | | | | | | **environmental engineering, industrial product and form design** | | | | | | | | | | | |
| *Lecturer:* | | **Dr González Henry** | | | | | | | | | | | | | | | | |
| *Required preliminary knowledge:* | | | | | | | MathematicsI NMXAN1EBNE | | | | | | | | | | | |
| *Weekly teaching hours:* | | *Lecture:* | | **2** | | | *Practical work:* | | | **3** | | | *Laboratory work:* | | **0** | | | |
| *Exam type:* | | | | **writ-ten exam** | | | *Language of course:* | | | **English** | | | *In timetable:* | | Lecture: Monday: 13:30-15:10  Practice: Wednesday: 12:35-15:10 | | | |
| **Curriculum** | | | | | | | | | | | | | | | | | | |
| *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, vectoranalysis. A survey of the basic concepts in combinatorics, probability and mathematical statistics. | | | | | | | | | | | | | | | | | | |
| ***Detailed schedule of the course:*** | | | | | | | | | | | | | | | | | | |
| ***Topics of lectures****:* | | | | | | | | | | | | | | | | | | |
| Week No. | Date | | Description | | | | | | | | | | | | | | | |
| 1. | 2022 Feb 07 | | Systems of linearequations. Gauss--Jordan elimination. Rank of a matrix. | | | | | | | | | | | | | | | |
| 2. | Feb.14 | | First order differential equations. General and particular solutions. Separable differential equations. First-order linear differential equations. | | | | | | | | | | | | | | | |
| 3. | Feb.21 | | Second-order linear differential equations with constant coefficients. Damped and harmonic oscillations. | | | | | | | | | | | | | | | |
| 4. | Feb.28 | | 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. | | | | | | | | | | | | | | | |
| 5. | Mar 07 | | Solution of Problems of Test 1 | | | | | | | | | | | | | | | |
| 6. | Mar 21 | | Test 1 | | | | | | | | | | | | | | | |
| 7. | Mar 26 | | Hesse-determinant. Extrema of functions of two variables. Areal and volume integral, calculation of volumes. | | | | | | | | | | | | | | | |
| 8. | Mar 28 | | Line and surface integrals. Jacobi matrix. Divergence, curl. Vector field without sources and whirls. Scalar and vector potential. Stokes-type theorems. | | | | | | | | | | | | | | | |
| 9. | Apr 04 | | Event algebras, probability fields. Geometrical probability. Conditional probability. The full probability theorem. Sampling with replacement and without replacement. | | | | | | | | | | | | | | | |
| 10. | Apr 11 | | Random variables of discrete and continuousdistributions. Expectations, standard deviations. Binomial and hypergeometrical distributions, sampling. Exponential and normaldistributions. | | | | | | | | | | | | | | | |
| 11. | Apr 18 | | **Hollydays** | | | | | | | | | | | | | | | |
| 12 | Apr 25 | | Statistical samples. Sample average, empirical deviations. The equation of the regression line. | | | | | | | | | | | | | | | |
| 13 | May 02 | | Test 2. | | | | | | | | | | | | | | | |
| 14 | May 09 | | Retake for signature | | | | | | | | | | | | | | | |
| ***Practical work:*** | | | | | | | | | | | | | | | | | | |
| No. | Date | |  | | | | | | | | | | | | | | | |
| 1. | 2022 Feb 09 | | Solvability of linear systems byelimination.. | | | | | | | | | | | | | | | |
| 2. | Feb.16 | | Initial problems for Separable Differential Equations and First Order Linear equations. | | | | | | | | | | | | | | | |
| 3. | Feb 23 | | Initial problems for 2nd-order linear equations with constant coefficients. | | | | | | | | | | | | | | | |
| 4. | Mar 2 | | Partialderivatives, derivatives in a given direction. Tangent plane and Normal line. | | | | | | | | | | | | | | | |
| 5. | Mar 09 | | Preparation for Test 1(Solution of Problems) | | | | | | | | | | | | | | | |
| 6. | Mar 16 | | Extrema of function of two variables. | | | | | | | | | | | | | | | |
| 7. | Mar 23 | | Area lintegral. | | | | | | | | | | | | | | | |
| 8. | Mar 30 | | Divergence, curl. Line integral, potential function. | | | | | | | | | | | | | | | |
| 9. | Apr 06 | | Line integral, potential function. | | | | | | | | | | | | | | | |
| 10. | Apr 13 | | Sampling with and without replacement. | | | | | | | | | | | | | | | |
| 11 | Apr 20 | | Basic properties of cumulative distibution function and probability densities. | | | | | | | | | | | | | | | |
| 12 | Apr 27 | | Preparation of Test 2(Solution of Problems) | | | | | | | | | | | | | | | |
| 13 | May 4 | | Sample average, empirical deviation, linear correlation coefficient. Regression line. Retake Exercises. | | | | | | | | | | | | | | | |
| 14 | May 11 | | Retake and Exam 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). | | | | | | | | | | | | | | | | | |
| *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. | | | | | | | | | | | | | | | | | | |
| *Type of exam (written, oral, tests etc.) and the method of assessment:* | | | | | | | | | | | | | | | | | | |
| Written exam from the material of the whole semester for max. 26 pts.  Marking:  22-26: excellent (5)  18-21: good (4)  14-17: satisfactory (3)  10-13: pass (2)  0 - 9: fail (1) | | | | | | | | | | | | | | | | | | |
| **Literature** | | | | | | | | | | | | | | | | | | |
| *Compulsory:* | | |  | | | | | | | | | | | | | | | |
| *Recommended:* | | | Thomas, G.B. et al.: Thomas’ Calculus, 11e, Addison-Wesley, 2005, ISBN: 0-321-18558-7. | | | | | | | | | | | | | | | |
| *Others:* | | |  | | | | | | | | | | | | | | | |
| ***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: 23 January 2022**

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| **Lecturer: Henry González** |  | **Dean: Prof. dr.habil. László Koltai** |