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| 1. Course title: Analysis 3 lecture | | | | | |
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| 2. Code: | | 3. Type (lecture, practice etc.): lecture | | | |
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| 4. Contact hours: 2 hoursper week | | 5. Number of credits (ECTS): 2 | | | |
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| 6. Preliminary conditions (max. 3): Analysis 2 lecture+ seminar | | | | | |
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| 7. Announced:fall semester, spring semester, both | | | | | |
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| 8. Limit for participants: 40 | | | | | |
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| 10. Responsible teacher (faculty, institute and department):  Margit Pap PhD (Faculty of Science, Institute of Mathematics and Informatics, Department of Mathematics) | | | | | |
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| 11. Teacher(s) and percentage: | | Dr. Margit Pap | | 100 % | |
| Dr. Tímea Eisner | | 100 % | |
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| 12. Language:English | | | | | |
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| 13. Course objectives and/or learning outcomes:  **Objectives**: The lecture intends to introduce students to the basic notions of Mathematical Analysis 2: concepts of **indefinite integral, Riemann integral and their applications**. The course helps the development of problem solving skills.  Learning outcomes: students completing the course will have *knowledge* on basic concepts and theorems of Mathematical Analysis. They will be *able* to apply the properties of these concepts. They will have a *competence* of evaluating readings in Analysis 2. Their positive *attitude* towards methods calculating limits will increase significantly. | | | | | |
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| 14. Course outline   1. Primitive function, indefinite integral. Necessary condition of the existence of primitive function. Sufficient condition of the existence of primitive function. Example for a function of Darboux property which does not have a primitive function. 2. Operations and primitive functions. Integration by substitution. Integration by parts. 3. Integration of rational functions, integration by partial fractions. 4. Integration by trigonometric substitution. Tangent half-angle substitution. Integration of some exponential function types. Integration of irrational functions. 5. Method of Archimedes to evaluate the area below a parabola. Darboux upper and lower integral. Riemann integral. (Definite integral) 6. Oscillation criteria. The Riemann construction of the Riemann integral. The necessary condition of existence of Riemann integral. Operations and integration 1. Sum, constant multiple. 7. Operations and integration 2. Existence of integral of products or quotients of functions. Additivity of the intervals of integration. Theorem on the monotonicity of integrals. The theorem on the Riemann integrability of the absolute value. The first mean value theorem of the integral calculus. Sufficient conditions for integrability. Newton-Leibniz-theorem. 8. Integral function, theorem on the integral function. Differentiation under the integral sign. Integration by substitution and integration by parts for definite integrals. 9. Computing limits of sequences. Geometrical applications of the definite integral 1: area ( in cartesian coordinate system and with polar coordinates). 10. Geometrical applications of the definite integral 2: area given by parameterization, length of curve. 11. Geometrical applications of the definite integral 3: volume, surface area. 12. Improper integrals. Evaluating improper integrals. Conditions of improper integrability. Integral test. 13. Further applications of the Differential and integral calculus: the Wallis formula, the Stirling formula. The Newton algorithm for finding roots. | | | | | |
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| 15. Mid-semester works  Attending lectures is compulsory. | | | | | |
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| 16. Course requirements and grading  Written exam is based on lectures, accessible electronic sources and lecture materials.  There is a written preliminary exam. Preliminary exam grades:  0–55% fail  56–70% acceptable  71–80% average  81–90% good  91–100% excellent  After successful preliminary exam there is an oral exam in 3 topics. The final grade is obtained from the arithmetic mean of the 4 grades, but only in case when all parts hit the acceptable measure. | | | | | |
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| 17. List of readings  Rudin, Walter. Principles of mathematical analysis. Vol. 3. New York: McGraw-Hill, 1964.  Stewart, James. Calculus: early transcendentals. Cengage Learning, 2015.  Stroyan, K. D. "A brief introduction to infinitesimal calculus." University of Iowa (2004).  Lang, Serge. Undergraduate analysis. Springer Science & Business Media, 2013. | | | | | |
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| 18. Recommended texts, further readings  Joel R. Hass, Christopher D. Heil, Maurice D. Weir. Thomas' Calculus, 14th Edition. | | | | | |
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| **Date** | 14 May, 2017 | **Prepared by** |  | | |
| **Dr. Margit PAP** responsible teacher | | |
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| **Endorsed by** | | |  | | |
| Dr. László TÓTH program supervisor | | |