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| 1. Course title: Analysis 2 discussion | | | | | |
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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 1 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 course intends to introduce students to the basic notions of Mathematical Analysis 2: concepts of **function limits, differentiability, continuity** 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. Decomposition of rational functions as power series, Cauchy product. 2. Graph and function limits. Finding limits of functions by the definition or by the connection with limits of sequences. 3. Investigating limits of Dirichlet-type functions. Finding limits applying properties of operations 1. (Polynomial, rational function, „difference of roots”,  -type exercises. 4. Finding limits applying properties of operations 2. (Limit of type) Continuity. Continuity of Dirichlet-type functions. Classification of discontinuities. 5. Investigating uniform continuity applying the definition or the theorem. Computing the inverse function. 6. 1st test 7. Investigating differentiability applying the definition. Finding the tangent line. 8. Computing the derivatives. Computing limits via derivatives. 9. Exercises with the tangent line. Applications of mean value theorems. Applying derivatives to prove that a function is constant. Investigating the monotonicity using derivatives. 10. L’Hospital rule. Taylor-formula. 11. Application of Taylor formula for proof of inequalities and evaluation of function limits. 12. Complete investigation of a differentiable function (identify the domain, the intersections of the functions with both the *x*-axis and *y*-axis, classify the critical points and determine the intervals of increase/decrease, find the inflection points and determine the intervals of convexity/concavity, evaluate the limits at those congestion points of the domain which are not domain points, sketch the graph of the function.) 13. 2nd test | | | | | |
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| 15. Mid-semester works  Attending the course is compulsory. | | | | | |
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| 16. Course requirements and grading  There are two written tests, both of which should be above 40% in order to pass. The final grade is obtained from the arithmetic mean of the 2 grades.  0–40% fail  41–55% acceptable  56–70% average  71–85% good  86–100% excellent | | | | | |
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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 | | |