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| 1. Course title: Analysis in Several Variables seminar | | | | | |
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| 2. Code: | | 3. Type (lecture, practice etc.): seminar | | | |
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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 course intends to introduce students to the basic notions of Multivariable Analysis: concepts of limits, continuous functions, differentiability, **multivariable differential and integral calculus 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 Multivariable Analysis. They will be *able* to apply the properties of these concepts. They will have a *competence* of evaluating readings in Analysis. Their positive *attitude* towards methods calculating limits will increase significantly. | | | | | |
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| 14. Course outline   1. Metric space, norm space, Euclidean space. (Cauchy-Schwarz inequality, Minkowski-inequality with proof), Banach-space, Hilbert-space. Examples. Boundedness of sets in metric spaces and in **Rn**. 2. Boundedness and convergence of sequences in **Rk**. Establishing the domain, range of multivariable functions. 3. Evaluating limits and investigating convergence of functions in **Rk**. Iterated limits, limit properties, polar coordinates. 4. Continuity of multivariable functions. 5. Differentiability of multivariable functions. Partial derivatives, directional derivatives. Geometrical meaning. Tangent plane. 6. 1st test 7. Investigating differentiability using the definition. 8. Higher order partial derivatives. 9. Bivariate Taylor formula. Local extrema for real functions of several variables. 10. Implicit function theorem. Constrained extrema. Lagrange multiplier method. 11. Double integral. Interal transformation. Polar coordinate transformation. 12. Applying the double integral to compute area, volume, mass, centres of gravity. Evaluation of a Gauss integral applying a double integral. 13. 2nd test | | | | | |
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| 15. Mid-semester works  Attending lectures 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.  Dineen, Seán, Multivariate calculus and geometry. Springer, 2001.  Moskowitz, Martin A., and Fotios Paliogiannis. Functions of several real variables. World Scientific, 2011. | | | | | |
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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 | | |