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| **1. Course title:** Fourier Series | | | | | |
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| **2. Code:** | | **3. Type (lecture, practice etc.):** lecture | | | |
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| **4. Contact hours: 3** hoursper week | | **5. Number of credits (ECTS):** 5 | | | |
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| **6. Preliminary conditions (max. 3):**   * Analysis 3 lecture and seminar | | | | | |
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| **7. Announced:** ☐fall semester, ☒spring semester, ☐both | | | | | |
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| **8. Limit for participants:** 150 | | | | | |
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| **10. Responsible teacher (faculty, institute and department):**  Tímea Eisner PhD (Faculty of Science, Institute of Mathematics and Informatics, Department of Mathematics) | | | | | |
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| **11. Teacher(s) and percentage:** | | Tímea Eisner, PhD | | 100 % | |
| Margit Pap, PhD, dr. Habil | | 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 world of Fourier Series, and Fourier transform.  **Learning outcomes:** students completing the course will have familiarity with questions and methods related to problems involving Fourier Series. | | | | | |
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| **14. Course outline**   1. Review of theory function sequences and series and other topics needed later. (Lebesgue-integral, Beppo-Levi Theorem, Lebesgue-theorem, Fatou-lemma, Lebesgue-measurable sets and functions, without proves.) 2. The -space. Riesz-Fischer theorem. 3. The definition of orthogonal and complete orthogonal system. Distance from a finite subspace. Parseval formula. Riesz-Fischer-theorem for orthogonal series. 4. The completeness and orthogonality of the trigonometric system. Trigonometric Fourier series. Riemann-Lebesgue lemma. 5. Dirichlet-formula. The properties of the Dirichlet kernel. The criterion of Dini and Lipschitz. Corollaries. 6. Functions of bounded variations. Example for a continuous function which is not differentiable anywhere. Dirichlet-Jordan theorem. 7. Calculating of Fourier-series of functions. Examination of the convergence of Fourier series. 8. Cesaro and Abel summation. Connection between the two summations. 9. The properties of the Fejér’s kernel function. Theorem of Fejér and its corollaries. Lebesgue theorem. The Abel summation of Fourier series. 10. The complex form of the trigonometric system. Examples. 11. The definition and properties of the Fourier-transform. 12. The Fourier Inversion theorem. Examples. 13. The definition of the discrete Fourier-transform and its properties. The inversion formula for the discrete Fourier-transform. | | | | | |
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| **15. Mid-semester works**  Attending lectures is highly recommended. | | | | | |
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| **16. Course requirements and grading**  The semester ends with an 100 point written exam. Depending on the score the grades are the following:  0%–41% fail (F)  42%–54% satisfactory (D)  55%–67% average (C)  68%–83% good (B)  84%–100% excellent (A) | | | | | |
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| **17. List of readings**   1. .Schipp, F. Wade, S.-Transforms and normed fields 2. Zygmund: Trigonometric Series | | | | | |
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| **18. Recommended texts, further readings** | | | | | |
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| **Date** | 4 May, 2017 | **Prepared by** |  | | |
| Tímea Eisner, PhD  responsible teacher | | |
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| **Endorsed by** | | |  | | |
| László Tóth, PhD, Dr. Habil program supervisor | | |