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| **Course code** | CC2 |
| **Type and description** |  |
| **ECTS credit** | 1 |
| **Course name** | Modern Mathematical Analysis 2 |
| **Course name in Polish** | Nowoczesna Analiza Matematyczna 2 |
| **Language of instruction** | English |
| **Course level** | 8 PRK |
| **Course coordinator** | Wojciech Kryszewski |
| **Course instructors** | Marek Balcerzak, Wojciech Kryszewski |
| **Delivery methods and course duration** | |  | **Lecture** | **Tutorials** | **Laboratory** | **Project** | **Seminar** | **Other** | **Total of teaching hours during semester** | | --- | --- | --- | --- | --- | --- | --- | --- | | Contact hours | 12 | 0 | 0 |  | 3 | 0 | 15 | | E-learning | No | No | No | No | No | No |  | | Assessment criteria (weightage) | 0,00 |  |  |  |  | 0,00 |  | |
| **Course objective** | 1. Acquisition of knowledge on the rudiments of the Fourier analysis: convergence of Fourier series and Fourier transform.  3. Acquisition of knowledge concerning Sobolev spaces and their applications in boundary value problems. |
| **Learning outcomes** | After the course a PhD student we be able to:  1. understand and apply theorems in theory of Sobolev spaces: effects W1, U2, K3;  2. understand and study problems in function spacer with the use of the Fourier analysis methods – effects W2, U1, K1-K3  3. apply the acquired knowledge in order to study various problems in concrete mathematical problems: effects U1, K1-K3 |
| **Assessment methods** | Effects W1, U2, W2 – oral examination  effects U1, K1-K3…. – presentation  The final evaluation is based on:  Exam - 80%  Presentation - 20% |
| **Prerequisites** | The contents of the master degree course on the differential and integral calculus |
| **Course content with delivery methods** | Lecture  1. Elements of Fourier analysis; Fourier series and their convergence; Fourier series in Hilbert spaces.  2. Fourier and Laplace transforms; operation of convolution; applications to theory of partial differential equations.  3. Weak derivatives calculus; Sobolev spaces; interpolation and Nirenberg-Gagliardo inequalities; emebeddings of Sobolev spaces.  Presentation  Duality in spaces of continuous, integrable or Sobolev functions. |
| **Basic reference materials** | 1. W. Ziemer, Modern Real Analysis, Springer GTM 278, 2017  2. E. Lieb, M. Loss, Analysis, Graduate Studies in Mathematics 134, AMS, 2002  3. W. Rudin, Analiza rzeczywista i zespolona, PWN 1987 |
| **Other reference materials** |  |
| **Average student workload outside classroom** | 10 h |
| **Comments** |  |
| **Last update** |  |