

**DOCTORAL (PHD) STUDIES
COURSE DESCRIPTION**

Course title	Field of science	Faculty	Institute
Zeta Functions	Mathematics (N 001)	Faculty of Mathematics and Informatics	Institute of Mathematics
Study method	Number of credits	Study method	Number of credits
Lectures	0	Consultations	1
Individual work	4	Seminars	0

Course summary

1. Dirichlet series. Euler gamma function.
2. Riemann zeta-function $\zeta(s)$. Functional equation. Approximate functional equation. Zeros of $\zeta(s)$. Bounds for $\zeta(s)$. Moments. Riemann and Lindelöf hypotheses. Limit theorems for $\zeta(s)$. Universality of $\zeta(s)$.
3. Dirichlet L-functions. Dirichlet characters. Functional equation.
4. Other zeta-functions. Lerch zeta-function, Selberg class, L-functions.

Main literature

1. H. Iwaniec and E. Kowalski, *Analytic Number Theory*, Amer. Math. Soc. Colloq. Publ. 53, Amer. Math. Soc., Providence, 2004.
2. H. Davenport, *Multiplicative Number Theory*. Springer-Verlag, New York, 1980.
3. A. Laurinčikas, R. Garunkštis, *The Lerch Zeta-Function*. Kluwer Academic Publishers, Dordrecht, Boston, London, 2002.
4. A. Laurinčikas, *Rymano dzeta funkcijos teorijos pagrindai*. Vilniaus universiteto leidykla, Vilnius, 1992.
5. A. Laurinčikas, *Limit Theorems for the Riemann zeta-function*. Kluwer Academic Publishers, Dordrecht, Boston, London, 1996.
6. E. C. Titchmarsh, *The theory of the Riemann zeta-function*. Second edition. Edited and with a preface by D. R. Heath-Brown, The Clarendon Press, Oxford University Press, New York, 1986.
7. J. Steuding, *Value-distribution of L-functions*, Springer, Berlin, 2007.

Consulting teacher	Scientific degree	Pedagogical name	Main publications in the field of science of the last 5 year period
Ramūnas Garunkštis	Dr. (HP)	Prof.	<ol style="list-style-type: none"> 1. R. Garunkštis, Zeros of the extended Selberg class zeta-functions and of their derivatives. <i>Turkish J. Math.</i> 43 (2019), no. 6, 2921–2930. 2. P. Drungilas, R. Garunkštis, A. Novikas, On second moment of Selberg zeta-function for $\sigma=1$. <i>Results Math.</i> 76 (2021), no. 4, Paper No. 184, 18 pp. 3. R. Garunkštis, Selberg zeta-function associated to compact Riemann surface is prime, <i>Rev. Un. Mat. Argentina</i> 62 (2021), 213–218.
Antanas Laurinčikas	Habil. dr.	Prof.	<ol style="list-style-type: none"> 1. A. Laurinčikas, Discrete universality of the Riemann zeta-function in short intervals. <i>Appl. Anal. Discrete Math.</i> 14 (2020), no. 2, 382–405. 2. A. Laurinčikas, Approximation of analytic functions by an absolutely convergent Dirichlet series. <i>Arch. Math. (Basel)</i> 117 (2021), no. 1, 53–63. 3. A. Laurinčikas, Approximation by generalized shifts of the Riemann zeta-function in short intervals. <i>Ramanujan J.</i> 56 (2021), no. 1, 309–322.

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Board Chairman – assoc. prof. dr. Kristina Lapin