DOCTORAL (PHD) STUDIES
COURSE DESCRIPTION

Course title	Field of science	Faculty	Institute
Differential Problems with Nonlocal Boundary Conditions	Mathematics (N 001)	Faculty of Mathematics and Informatics	Institute of Applied Mathematics
Study method	Number of credits	Study method	Number of credits
Lectures	0	Consultations	1
Individual work	4	Seminars	0

Course summary
Mathematical models for solving practical problems, formulated in the language of differential equations, have recently become more complicated. One of the signs of this complexity is the nonlocal boundary conditions. Boundary value problems for differential equations with nonlocal conditions are one of the branches of differential equations developed at a rapid pace over the last three to four decades. The development of the theory of this branch is motivated by both the internal needs of mathematics and modern applications. Problems with nonlocal conditions: formulation and examples. Problems for a simple differential equation. One-dimensional parabolic equations. Two-dimensional elliptic and parabolic equations. Iterative methods for systems of differential equations with nonlocal conditions. Non-self-adjoint differential operators.
Main literature
1. M. Sapagovas. Diferencialinių lygčių kraštiniai uždaviniai su nelokaliosiomis sąlygomis. MII, Vilnius, 2007.
2. R. Mennicken, M. Moeller. Non-self-adjoint boundary eigenvalue problems. Elsevier Science B. V., 2003.
3. А. А. Самарский, Е.С. Николаев. Методы решения сеточных уравнений. Наука, Москва, 1978.
4. M. Dehghan. Efficient techniques for the second- order parabolic equation subject to nonlocal specification. Applied Numer. Math., 52, pp. 39-62, 2005.

Consulting teacher	Scientific degree	Pedagogical name	Main publications in the field of science of the last 5 year period
Artūras Štikonas	Dr. (HP)	Prof.	1. K. Bingelė, A. Bankauskienė, A. Štikonas. Spectrum curves for a discrete Sturm–Liouville problem with one integral boundary condition. *Nonlinear Anal. Model. Control*, 24(5):755–774, 2019. https://doi.org/10.15388/NA.2019.5.5 2. M. Sapagovas, J. Novickij, A. Štikonas. Stability analysis of a weighted difference scheme for two-dimensional hyperbolic equations with integral conditions. *Electron. J. Differential Equations*, 2019(04):1–13, 2019. https://ejde.math.txstate.edu/Volumes/2019/04/abstr.html 3. K. Bingelė, A. Bankauskienė, A. Štikonas. Investigation of spectrum curves for a Sturm–Liouville problem with two-point nonlocal boundary conditions. *Math. Model. Anal.*, 25(1):53–70, 2020. https://doi.org/10.3846/mma.2020.10787 4. E. Şen, A. Štikonas. Asymptotic distribution of eigenvalues and eigenfunctions of a nonlocal boundary value problem. *Math. Model. Anal.*, 26(2):253–266, 2021. https://doi.org/10.3846/mma.2021.13056

			5. A. Štikonas, E. Şen. Asymptotic analysis of Sturm–Liouville problem with nonlocal integral-type boundary condition. *Nonlinear Anal. Model. Control*, 26(5):969–991, 2021. https://doi.org/10.15388/namc.2021.26.24299

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Board Chairman – assoc. prof. dr. Kristina Lapin