

**DOCTORAL (PHD) STUDIES
COURSE DESCRIPTION**

Course title	Field of science	Faculty	Institute
Probabilistic machine learning algorithms	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
Linear and non-linear dimension reduction techniques, regression models, regression trees, classification models, classification trees, support vector machines, artificial neural networks, error reduction techniques, cluster analysis, distance geometry.
Main literature
1. Izenman, Alan Julian. <i>Modern multivariate statistical techniques. Regression, classification and manifold learning</i> . Springer Science+Business Media New York, 2013.
2. Murphy, Kevin P. <i>Machine learning: a probabilistic perspective</i> . MIT press, 2012.
3. Shalev-Shwartz, Shai, and Shai Ben-David. <i>Understanding machine learning: From theory to algorithms</i> . Cambridge university press, 2014.

Consulting teacher	Scientific degree	Pedagogical name	Main publications in the field of science of the last 5 year period
Jurgita Markevičiūtė	Dr.	Assoc. Prof.	<p>1. Markevičiūtė, Jurgita; Bernatavičienė, Jolita; Levulienė, Rūta; Medvedev, Viktor; Treigys, Povilas; Venskus, Julius. Impact of COVID-19-related lockdown measures on economic and social outcomes in Lithuania // <i>Mathematics</i>. Basel : MPDI. 2022, vol. 10, no. 15, art. no. 2734, p. [1-20].</p> <p>2. Markevičiūtė, Jurgita; Bernatavičienė, Jolita; Levulienė, Rūta; Medvedev, Viktor; Treigys, Povilas; Venskus, Julius. Attention-based and time series models for short-term forecasting of COVID-19 spread // <i>CMC-Computers, materials & continua</i>. Henderson, NV : TECH Science Press. 2022, vol. 70, no. 1, p. 695-714.</p> <p>3. Venskus, Julius; Treigys, Povilas; Markevičiūtė, Jurgita. Unsupervised marine vessel trajectory prediction using LSTM network and wild bootstrapping techniques // <i>Nonlinear analysis : modelling and control</i>. Vilnius : Vilniaus universiteto leidykla. ISSN 1392-5113. vol. 26, no. 4, p. 718-737.</p> <p>4. Norkus, Zenonas; Markevičiūtė, Jurgita. New estimation of the gross domestic product in Baltic countries in 1913–1938 // <i>Cliometrica</i>. Heidelberg : Springer. 2021, vol. 15, iss. 3, p. 565-674.</p>

Approved by Mathematics and Informatics Faculty board/2021. Protocol No.
Board Chairman –