

Tárgy neve: Topics in Applied Mathematics

Tárgyfelelős neve: Lóczi Lajos

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: AT

Az oktatás célja angolul / Aim of the subject:

Knowledge:

- They have comprehensive and up-to-date knowledge of general mathematical and computing principles, rules and relationships, particularly—depending on their chosen specialization—in the following areas: algebraic and linear algebraic methods and applications; special fields of mathematical analysis, numerical methods and their applications; theoretical basics and applications of probability theory and statistics.

Abilities:

- They are able to apply their mathematical, computer science and informatics skills in a novel way in order to solve tasks in IT research and development. They are able to formalize complex IT tasks, to identify and study their theoretical and practical background and then to solve them.

Attitude:

- They follow professional and technological developments in their IT field. They are committed to critical feedback and evaluation based on self-examination. They are committed to lifelong learning, and are open to acquiring new IT competencies.

Autonomy, responsibility:

- They take responsibility for their professional decisions made in their IT-related activities.

Az oktatás tartalma angolul / Major topics:

Vector spaces, linear operators in finite and infinite dimensions, eigenvalues, eigenvectors. Multilinear operators. Matrix decompositions. Matrix functions. Inner-product spaces, orthogonality, angle, the Gram--Schmidt algorithm. Normed spaces, induced norms, operator norms. Metric spaces. Banach spaces and Hilbert spaces. Fourier series. Orthogonal projections, the Moore--Penrose pseudoinverse, the method of least squares. SVD and PCA. Probability spaces, discrete and continuous random variables. Discrete and continuous distributions. Univariate and bivariate descriptive statistics. Covariance, correlation and independence. Entropy.

A számonkérés és értékelés rendszere angolul / Requirements and evaluation:

mixed assessment, practice grade

Irodalom / Literature:

- Gilbert Strang, Introduction to Linear Algebra, 5th Edition, 2016, Wellesley-Cambridge Press, ISBN: 978-09802327-7-6
- K. W. Gruenberg, A. J. Weir, Linear Geometry, 2nd Edition, 1977, Springer, ISBN-13: 978-0387902272
- William Feller, An Introduction to Probability Theory and Its Applications, Vol. 1-2, 3rd Edition, 2008, John Wiley & Sons Inc., ISBN-13: 978-8126518050
- John A. Rice, Mathematical Statistics and Data Analysis, 3rd Edition, 2010, Cengage Learning, ISBN-13: 978-8131519547
- Thomas M. Cover, Joy A. Thomas, Elements of Information Theory, 2nd Edition, 2006, Wiley Series in Telecommunications and Signal Processing, ISBN-13: 978-0471241959