PÁZMÁNY
Pázmány Péter Catholic University
Faculty of Information Technology and Bionics

Academic Administration Office

Institutional ID: FI79633
H-1083 Budapest, Práter Str. 50/A

Master's program
Entrance examination topics

Mathematics

1. Real numbers. Sequences and series of numbers. Complex numbers.
2. Functions of real variable. Derivative. Taylor's polynomial.
3. Riemann integral. Fundamental theorem of calculus. Newton-Leibniz's formula.
4. Linear differential equations. Linear systems.
5. Power series expansion. Fourier series.
6. Functions of more variables. Gradient and Hesse matrix. Local extremal values.
7. Multiple integrals. Change of variables in multiple integrals. Path integral of a vector field.
8. The Fourier integral. Inverse Fourier transform. Time- and frequency domain descriptions.
9. Complex functions. Line integral of complex functions. Zeros and poles.
10. Vector spaces. Linearly Independent Sets, Bases. Coordinate Systems. Dimension.
11. Vector algebra. 2d and 3d Vectors: Inner Product, Cross-Product, Mixed Product.
12. Matrix Operations: addition, multiplication, transpose. Inverse of a Matrix.
13. Vector Equations of a linear system of equations. The Matrix Equation Ax = b
14. Determinants. Applications: Area, Volume and Determinants.
15. Linear maps. Kernel, Image, Dimension formula. Eigenvalues, Eigenvectors.
16. Relations. Equivalence Relations, Partitions. Order Relations, Maximal/Minimal elements.
17. Representing Graphs, Graph Isomorphism. Euler and Hamilton Circles. Trees.
18. Propositional calculus. Basic and derived argument forms.

Recommended literature:

R. Courant – F. John: *Introduction to Calculus and Analysis I-II.* Springer.
D. C. Lay: *Linear Algebra and Its Applications*. University of Maryland, Pearson.
K. H. Rosen: *Discrete Mathematics with Applications*. Mcgraw Hill.
J. Stewart: *Calculus*. ISBN-13: 978-1285740621