DOCTORAL SCHOOL OF INFORMATICS
COMPLEX EXAM SUBJECT

Numerical calculations (main subject)

Numerical algorithms for eigenvalues (symmetric, tridiagonal cases; Jacobi iteration, LU, QR algorithms)

Interpolation and approximation methods (polynomial and spline interpolation, Hilbert space approximation, Chebyshev approximation)

Numerical solution of nonlinear equations and systems (Newton, Broyden method, continuation methods)

Numerical integration methods (Newton-Cotes, Gauss, orthogonal polynomials)
Gradient and conjugate gradient methods for solving linear systems

Chebyshev polynomials and their properties; Chebyshev series expansion and its application for polynomial coefficients and solving ordinary linear differential equations

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References:

1. Endre Süli and David Mayers: An Introduction to Numerical Analysis, Cambridge University Press, 2003

2. Amparo Gil, Javier Segura, Nico M. Temme: Numerical Methods for Special Functions, SIAM, 2007

3. Hammerlin-Hoffmann:Numerical Mathematics, Springer-Verlag, 1991