Cracow University of Technology

Course title: Numerical Analysis
Department: F-3, Department of Computer Science
Course code: F3-NA
Erasmus subject code: Informatics, Computer Science
Number of contact hours: 45 hours
Course duration: 1 semester
ECTS credits: 6

Course outline:

Computer Arithmetics
Floating-point arithmetics, machine epsilon, error analysis
Numerical methods for Nonlinear Equations
Iterative methods, Bisection method, Fixed point iteration, Newton's method, Secant method, Newton's method for systems
Numerical methods for Linear Equations
Gaussian Elimination, The LU Factorization
Polynomial interpolation
Taylor series, Vandermonde polynomial, Newton polynomial, Lagrange Polynomial,
Numerical Differentiation
Numerical methods for: initial value problems (Euler method, Runge-Kutta methods), boundary value problems (Finite difference method), eigenvalue problem (Finite difference method).
Numerical Integration
Midpoint rule, Trapezoidal rule, Simpson's rule

Literature:
Course notes (slides),

Josef Stoer and Roland Bulirsch, *Introduction to Numerical Analysis,* Springer, 1974

Jeffrey R. Chasnov, *Introduction to Numerical Methods*, The Hong Kong University of Science and Technology, available at: **https://www.math.ust.hk/~machas/numerical-methods.pdf**

Course type: Lectures and laboratories

Assessment method: Attendance, evaluation of assignments, final exam
Prerequisites: linear algebra, calculus I, programming languages

Course Insturctor:
dr Ilona Urbaniak, **ilona.urbaniak@pk.edu.pl**

Grading scheme:
Lab assignments: 60%
Final Examination: 40%