



FACULTY: ENVIRONMENTAL AND THERMAL POWER ENGINEERING

COURSE TITLE: Numerical Methods

Number of contact hours: 45

Duration: 1 semester

ECTS credits: 5

Programme description: The course covers the fundamental of numerical methods including the following topics: introduction, mathematical modelling, sources of errors in the process of numerical analysis and methodology of solution; Taylor series, round-off errors, approximation errors, concepts of stability, consistency and convergence; linear algebra, LU decomposition, determination of an inverse matrix, systems of tridiagonal equations; iterative methods for solving linear equations: Gauss-Seidel method, Successive over relaxation method, numerical solution of ODE and PDE. Laplace and Poisson equations, concepts of finite difference and finite element methods; Parabolic equations: explicit, implicit and Crank-Nicolson, numerical differentiation, numerical integration; Nonlinear equations and systems of equation including Newton-Raphson method, secant method, bisection method; Optimization.

Students will gain new skills and competences in numerical method. They will understand the procedures coding in MATLAB. They will be able to implement each important numerical routine for solving engineering problems.

Course type: lectures (30), workshops (15),

Literature:

1. Hoffman J.D — Numerical methods for engineers and Scientists, New York, 1992, McGraw-Hill
2. Fortuna Zenon, Macukow Bohdan, Wąsowski Janusz — Metody numeryczne, Warszawa, 2006, WNT
3. Chapra Steven C. Numerical Methods for Engineers, New York, 2014, McGraw-Hill

Assessment method: test, computer lab reports

Lecturer: Paweł Ocioń

Contact person: Paweł Ocioń, poclon@mech.pk.edu.pl