

Numerical methods in physics

Introductory information (full info → Syllabus)

- **lectures:** 5 x 3 h = 15 hours
- **computer labs:** 15 x 2h = 30 hours

- **lecturer & lab stuff:**

Dr Hab. Eng. Tomasz Chwiej

email: chwiej@fis.agh.edu.pl

phone: 617-44-71 (44-71 internal university phone number)

personal contact: room 318, building D7, 3 floor

- **office hours:** 13:00-14:00, monday, room 318, buiding D7

kind request concerning the office hours

If You would like to meet me at different time, let me know sending me an email with proposition of time and date of meeting convinient for You (but before see my schedule at Unitime)

- **webpage**

<http://galaxy.agh.edu.pl/~chwiej/nmp.html>

Lectures:

- attendance not required but kindly requested
- no exam/coloquia, the final grade comes from the partial grades achieved at computer labs

Computer labs:

- students are obliged to attendance the labs
- during the labs students make short numerical project, their activity are assessed
- preferred programming language: C/C++
- each project is accomplished with report prepared at home which is also assessed, the reports in electronic form (pdf-format) should be sent to instructor (the link + other instructions will be given at first computer lab → UPEL platform)

During the course there will be presented **the most basic numerical methods** used in computations with adequate algorithms (for simple cases only) with applications in physical problems (but without deep backgrounds – these are left for other specialized modules: *Computational Physics*, *Numerical Methods in Engineering* provided etc.)

Numerical projects conducted at computer labs will follow closely the content presented at lectures

- heavy stress is put on „practising numerical methods” to improve the students’ computational programming skills and competences.

Outline of the course

- basics of computer arithmetics & numerical errors
- solving linear systems of algebraic equations
- matrix diagonalization
- solving nonlinear equations
- interpolation of functions
- approximation of functions
- minimization (optimization) of function value
- fast Fourier transform
- numerical integration

Bibliography (basic):

- „Numerical recipes: the art of scientific computing”, W.H. Press et al., Cambridge University Press

additional:

- „Matrix computations”, G.H.Golub, C.F. van Loan, John Hopkins Univeristy Press
- „Numerical methods for engineers ans scientists”, J.D. Hoffman, Marcel Dekker, Inc.