Study programme(s): Computer Science

Level: bachelor

Course title: Introduction to Computational Science

Lecturer: Nataša Krklec Jerinkić

Status: obligatory

ECTS: 7

Requirements: ---

Learning objectives

- Knowledge of selected fundamental algorithms in computational science
- Knowledge of essential notions and methods in computational science
- Knowledge of basic techniques for analysis of numerical algorithms

Learning outcomes

- Ability to choose the appropriate numerical method for concrete problems
- Ability to interpret numerical results
- Ability to implement numerical algorithms efficiently in selected programming languages

Syllabus

- Error, stability, convergence, including truncation and round-off
- Function approximation including Taylor's series, interpolation, extrapolation, and regression
- Numerical differentiation and integration (Simpson's Rule, explicit and implicit methods)
- Differential equations (Euler's Method, finite differences)
- Direct and iterative methods for linear systems
- Linear least squares problems
- Eigenvalue decomposition; singular value decomposition
- Introduction to modeling

Literature

1. Uri Ascher and Chen Greif: A First Course in Numerical Methods. SIAM, 2011.
2. Gilbert Strang: Computational Science and Engineering. Wellesley, MA: Wellesley-Cambridge Press, 2007

Weekly teaching load

Lectures:	Exercises:	Practical Exercises:	Student research:	Other:
3	0	2	0	**0**

Teaching methodology

Lectures; revisions of the material; active students' participation in problem solving; knowledge test – colloquia; application of the taught material on real world examples.

Grading method (maximal number of points 100)

Pre-exam obligations	**Points**	**Final exam**	**points**
2 Colloquia	40	Final exam	60