COURSE DETAIL

COMPUTATIONAL METHODS OF THE NATURAL SCIENCES

Country
Germany

Host Institution
Free University of Berlin

Program(s)
Free University Berlin

UCEAP Course Level
Upper Division

UCEAP Subject Area(s)
Physics

UCEAP Course Number
113

UCEAP Course Suffix

UCEAP Official Title
COMPUTATIONAL METHODS OF THE NATURAL SCIENCES

UCEAP Transcript Title
COMPUTATNL METHODS

UCEAP Quarter Units
8.50

UCEAP Semester Units
5.70

Course Description

This course covers the following subjects: representations of numbers and arithmetic error (floating point math), functions and roots, linear and non-linear systems of equations, interpolation and approximative representations of functions, numerical differentiation and integration, ordinary and partial differential equations, eigenvalue problems (wave equations), molecular dynamics simulations (planet systems, Lennard-Jones liquids, molecular chaos), stochastics, Monte-Carlo integration, Monte-Carlo metropolis simulation (lattice spin model), optimization of non-linear problems, steepest descent, conjugate gradient, simulated annealing (traveling salesman problem), Fourier transforms, spectral analysis (analysis of acoustic signals, audio synthesis), networks, infection models, random walks, reaction-diffusion systems, predator-prey population dynamics, cellular automata (Game of Life), and artificial neural networks.

Language(s) of Instruction
German

Host Institution Course Number
20101201 ,20101202

Host Institution Course Title
COMPUTERGESTÜTZTE METHODEN DER EXAKTEN NATURWISSENSCHAFTEN

Host Institution Course Details
https://www.fu-berlin.de/vv/en/lv/1015222?m=1502467&pc=909347&sm=934771&id=1015...

Host Institution Campus

Host Institution Faculty

Host Institution Degree

Host Institution Department

Physik

Course Last Reviewed
2025-2026

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