SYLLABUS DEL CORSO

Esperimentazioni di Fisica Computazionale

1920-3-E3001Q066

Aims

Learning how to study physical problems on the computer with MATLAB

Contents

Detailed program

Part 1: Basic computational methods with MATLAB:
systems of linear equations, interpolation, zeros and roots, leastsquares, numerical integration, ordinary differential equations, Fast Fourier Transform, pseudorandom numbers, eigenvalues and eigenvectors, partial differential equations.

Part 2: in depth study with applications:
Monte Carlo methods, Markov chains, random walks on graph and on the continuum, Brownian motion, importance sampling. Operator splitting symplectic methods for classical dynamics and Liouville equation. Spectral and operator-splitting methods with FFT for the Schroedinger equation.

Prerequisites

Teachings of previous years and basic knowledge of Classical and Quantum Mechanics

Teaching form

Activity in computer lab.

Textbook and teaching resource

Numerical computing with MATLAB, Chris Moler, The Mathworks.

Calcolo Scientifico, Alfio Quarteroni, Fausto Saleri e Paola Gervasio, 6^a edizione, Springer.

Teacher's notes and diaries of the lab activity available on elearning.unimib.it

Semester

First and second

Assessment method

Homeworks and final report with oral discussion; overall grade for the lab activity, homeworks and oral exam.

Office hours

Anytime, after e-mail appointment.