COURSE DETAIL

ANALYTICAL MECHANICS
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 111
UCEAP Course Suffix
UCEAP Official Title ANALYTICAL MECHANICS
UCEAP Transcript Title ANALYTCAL MECHANICS
UCEAP Quarter Units 8.50
UCEAP Semester Units 5.70

Course Description

This course, comprised of a lecture and discussion section, includes the following topics: 1) Introduction (historical notes, coordinate dependence of Newton‘s equations, systems with constraints); 2) Lagrange equations (systems w/o constraints, non-inertial reference frames, constraints and generalized coordinates, virtual displacements, D’Alembert’s principle, systems w/ constraints); 3) Hamilton‘s principle (variational calculus, derivation of Lagrange equations from Hamilton’s principle, Lagrange multipliers and constraints); 4) Symmetries and conservation laws (cyclic coordinates and canonical momenta, translational and rotational invariance, Noether theorem, translational invariance in time and energy conservation, energy conservation in 1D systems, Galilei invariance and Lagrangian of free particles, relativistic mechanics of free particles, gauge invariance, mechanical similarity); 5) Oscillations (coupled oscillators, driven oscillators, Green function of damped oscillator, parametric resonance, motion in rapidly oscillating fields); 6) Rigid bodies (degrees of freedom, tensor of inertia and kinetic energy, angular momentum, principal axes of tensor of inertia, equations of motion, Euler angles, free symmetric top, heavy symmetric top, fast top).

Language(s) of Instruction
German

Host Institution Course Number
20113401

Host Institution Course Title
ANALYTISCHE MECHANIK

Host Institution Course Details
https://www.physik.fu-berlin.de/en/einrichtungen/ag/ag-von-oppen/teaching/AnalM...

Host Institution Campus

Host Institution Faculty

Host Institution Degree
Host Institution Department Physik
Course Last Reviewed 2024-2025

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