COURSE DETAIL

LAGRANGIAN DYNAMICS
Country United Kingdom - Scotland
Host Institution University of Edinburgh
Program(s) University of Edinburgh
UCEAP Course Level Upper Division
UCEAP Subject Area(s) Physics
UCEAP Course Number 129
UCEAP Course Suffix
UCEAP Official Title LAGRANGIAN DYNAMICS
UCEAP Transcript Title LAGRANGIAN DYNAMICS
UCEAP Quarter Units 4.00
UCEAP Semester Units 2.70

Course Description

The principles of classical dynamics, in the Newtonian formulation, are expressed in terms of (vectorial) equations of motion. These principles are recapitulated and extended to cover systems of many particles. The laws of dynamics are then reformulated in the Lagrangian framework, in which a scalar quantity (the Lagrangian) takes center stage. The equations of motion then follow by differentiation, and can be obtained directly in terms of whatever generalized coordinates suit the problem at hand. These ideas are encapsulated in Hamilton's principle, a statement that the motion of any classical system is such as to extremise the value of a certain integral. The laws of mechanics are then obtained by a method known as the calculus of variations. As a problem-solving tool, the Lagrangian approach is especially useful in dealing with constrained systems, including (for example) rotating rigid bodies, and one aim of the course is to gain proficiency in such methods. At the same time, students examine the conceptual content of the theory, which reveals the deep connection between symmetries and conservation laws in physics. Hamilton's formulation of classical dynamics (Hamiltonian Dynamics) is introduced, and some of its consequences and applications are explored.

Language(s) of Instruction
English

Host Institution Course Number
PHYS10015

Host Institution Course Title
LAGRANGIAN DYNAMICS

Host Institution Course Details
http://www.drps.ed.ac.uk/24-25/dpt/cxphys10015.htm

Host Institution Campus
Edinburgh

Host Institution Faculty

School of Physics and Astronomy

Host Institution Degree

Host Institution Department

Course Last Reviewed
2024-2025

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