Elective Course 13-E2-0016-vl Analytical Mechanics



TECHNISCHE UNIVERSITÄT DARMSTADT

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What are holonomic constraints and

what is the meaning of virtual displacement?



What are generalized coordinates and how do we define the generalized momentum?



What is the Poisson bracket representation of Hamiltonian mechanics?

How can we describe systems with friction and what is the physical meaning of the dissipation function?

What is the physical meaning of the Lagrange Multipliers?

What is the conservation law associated with isotropy of time?

Which law of conservation is obtained as space is isotropic?







What is an action functional and what is the derivation of the Euler-Lagrange-equation?





Teaching Content:

constraints, generalized coordinates,

virtual displacements, principles of d' Alembert and Jourdain, Lagrange equations of second and first kind, generalized potentials, Lagrange formalism with friction, cyclic coordinates,

canonical momentum, elements of variational calculus, Hamilton's principle,

Legendre transfromations, Hamilton's equations, Poisson brackets, canonical transformations, Hamilton-Jacobi-Theory, introduction to wave mechanics



For students of mechanics (B.Sc. and M.Sc.), computational engineering, mechanical engineering, civil and environmental engineering, materials and earth sciences, mathematics and physics Course dates **SoSe 2025** 3SWS lecture + 1SWS exercise | 6CP monday, 17.10-19.40h in L501/45a and monday, 19.50-20.40h in L501/45a

This lecture is held by Dr.-Ing. Dimitrios Makridis, a former member of the institute for mechanics under the module ownership of Prof. Dr.-Ing. Ralf Müller, active professor of the institute for mechanics in the department of civil and environmental engineering, TU Darmstadt.

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