UNIVERSITY of DEBRECEN

PEKÁR IMRE
DOCTORAL SCHOOL OF MECHANICAL ENGINEERING
H-4002 Debrecen, Ótemető str. 2-4.
e-mail: doktori@eng.unideb.hu
website: engphd.unideb.hu

Name of the course:	**Dynamics**
Course type:	Optional
Responsible lecturer:	Dr. Sándor Hajdu
Content:	The purpose of the subject is to deepen and expand the dynamic knowledge acquired through the master's degree, and to discuss it with higher-level mathematical methods. The subject covers the following areas. The concept of functionals, the Brachistron problem, functionals in mechanical systems. Application of the calculus of variations to solve mechanical problems, introduction of the Euler-Lagrange equation. Generalization of Newtonian mechanics, D'Alembert's principle, principle of virtual work, Hamilton's principle. Introduction to Lagrangian dynamics, the Lagrange function, writing equations of motion using Lagrangian dynamics. Hamiltonian dynamics and its comparison with Lagrangian dynamics. Holonomic and anholonomic constraints, the use of the Lagrange multiplier to take constraints into account. Nonlinear dynamic systems. Random phenomena in nonlinear systems, chaotic behaviour of nonlinear systems. Bifurcations.
Literature:	• Cline, D.: Variational Principles in Classical Mechanics, University of Rochester, Rochester, NY, 2021. • Scheck, F. A.: Mechanics, Springer-Verlag, Berlin Heidelberg, 1990. • Hand, L. N., Finch, J. D.: Analytical Mechanics, Cambridge University Press, 2008.