COURSE DESCRIPTION CARD – SPECIMEN

Faculty of Mechanical Engineering									
Field of study	**Mechanical Engineering**							**Degree level and programme type**	**Bachelor's degree**
Specialization/ diploma path								**Study profile**	
Course name	**Analytical Mechanics**							**Course code**	**IS-FME-00175S**
								Course type	
Forms and number of hours of tuition	**L**	**C**	**LC**	**P**	**SW**	**FW**	**S**	**Semester**	**summer**
	30	**30**						**No. of ECTS credits**	**5**
Entry requirements	Mathematics I, Engineering Mechanics								
Course objectives	Getting by students understanding new formalism of classical mechanics which is equivalent to Newtonian mechanics but allows numerous mechanical problems to be solved with greater efficiency than Newton's laws and possessing skills for application of alternative formulations for analysis of motion of particles and bodies.								
Course content	Difference between Newtonian and analytical mechanics. Constraints Classification: holonomic and non-holonomic, Generalized coordinates, velocities and forces, Equilibrium of conservative and non-conservative systems: Principle of virtual work, Dirichlet's theory, Equations of motions: D'Alembert's principle, Lagrange's equations od the first and second kind, Hamilton's equations, Principle of least action, Conservation laws, generalized momenta, properties of Lagrangian and Hamiltonian functions.								
Teaching methods	Regular lectures: regular lectures with presentations Regular classes: blackboard classes, work in groups, discussion, homework assignments Self- study under supervision: tutorial sessions with worked examples, discussion, problem solving, homework assignments.								
Assessment method	**Lecture - written and oral exam; classes – calculation of simple problems evaluation;**								
Symbol of learning outcome	**Learning outcomes**								**Reference to the learning outcomes for the field of study**
LO1	Student describes with understanding basic concepts of analytical mechanics								M1_W06
LO2	Student performs basic calculations of analytical mechanics								M1_W06, M1_U20
LO4	Student apply methods of analytical mechanics in analysis of mechanical problems								M1_W06, M1_U11
LO5									
LO6									

Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
LO1	written exam	L
LO2	written exam, in-class tests,	L, C
LO3	written exam, in-class tests,	L, C,
LO4	written exam, in-class tests,	L, C,
LO5		
LO6		

Student workload (in hours)		No. of hours
Calculation	lecture attendance or self-study	30
	participation in classes or self study	15
	working on projects, reports, etc.	5 ÷ 15
	participation in student-teacher sessions related to the classes	40 ÷ 50
	preparation for and participation in exams/tests	10
	TOTAL:	**120**

Quantitative indicators	HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation	**45-60**	**5**
Student workload – practical activities	**55-80**	

Basic references	1. J.R. Taylor, Classical Mechanics, University Sci.Books, California, 2005. 2. P.Hamill, A student's guide to Lagrangians and Hamiltonians, University Printing House, Cambridge, 2014.
Supplementary references	1. I. Bengtsson, Notes on Analytical Mechanics. 2017, http://www.fysik.su.se/~ingemar/anmek.pdf. 2. M. Cederwall, P. Salomonson, An Introduction to analytical mechanic, 2009, http://fy.chalmers.se/~tfemc/mekanikkompendium.pdf.

Organisational unit conducting the course	Department of Applied Mechanics and Computer Science, Bialystok University of Technology	Date of issuing the programme
Author of the programme	Marek Romanowicz	2019-03-21

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work,

S – seminar

Please notice!
Depending on number of students enrolled for the subject hours of tuition are as follows (for each 30 hours given in course description card):
1 – 2 students - 8 hours of tuition hours;
3 – 4 students - 12 hours of tuition;
5 – 6 students - 17 hours of tuition;
7 – 8 students - 21 hours of tuition;
9 and more students - hours of tuition given by a teacher as regular classes.