COURSE DESCRIPTION CARD – SPECIMEN

<table>
<tr><td colspan="10">Faculty of Mechanical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6"></td><td colspan="2">Degree level and programme type</td><td>Bachelor's degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6"></td><td colspan="2">Study profile</td><td></td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Applied and Computational Mechanics</td><td colspan="2">Course code</td><td>IS-FME-00183W</td></tr>
<tr><td colspan="2">Course type</td><td></td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>winter</td></tr>
<tr><td></td><td></td><td></td><td>30</td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>5</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Mathematics II, Engineering Mechanics II, Fundamentals of Computer Science</td></tr>
<tr><td>Course objectives</td><td colspan="9">To provide the students with theory-based knowledge required for formulating and solving problems relevant to mechanical engineering; to obtain an understanding of basics of numerical methods, including approximation (interpolation, least squares and statistical regression), integration, solution of linear and nonlinear equations, ordinary differential equations, and deterministic and probabilistic approaches.</td></tr>
<tr><td>Course content</td><td colspan="9">Project: elementary programming concepts, including variable types, data structures and functions in SciLab/MATLAB® environment. Numerical solution of linear and nonlinear systems of equations; numerical discretisation, ordinary and partial differential equations tensors; Fourier analysis; curve, surface and volume integration. Numerical methods for ODE, initial-value problems; root finding, Newton's method, boundary-value problems, process of developing mathematical model whose variables define the state of the system at a given time.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Project: formulating an engineering problem in a mathematical form, solving problems using numerical methods (Scilab/MATLAB® bulit-in functions), tutorial sessions with worked examples, work in groups, homework assignments</td></tr>
<tr><td>Assessment method</td><td colspan="9">project – project completion, presentation and discussion</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="7">Learning outcomes</td><td colspan="2">Reference to the learning outcomes for the field of study</td></tr>
<tr><td>LO1</td><td colspan="7">Student has well-ordered and theory-based knowledge of technical mechanics necessary for formulating and solving technical problems including static, kinematic and dynamic issues</td><td colspan="2">M1_W04</td></tr>
<tr><td>LO2</td><td colspan="7">Ability to choose and apply proper numerical routines and tools for solving simple engineering tasks</td><td colspan="2">M1_U10,M1_U07</td></tr>
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LO3	Ability to analyse simple kinematic and dynamic mechanisms	M1_U18
LO4	Understanding of the need and knowledge of the possibility of constant individual learning to improve professional, personal and social competence awareness of the responsibility for own work	M1_K01
LO5		
LO6		
Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
LO1	in-class tests, projects reports grading	P
LO2	in-class tests, projects reports grading	P
LO3	in-class tests, projects reports grading	P
LO4	in-class tests, projects reports grading	P
LO5		
LO6		

Student workload (in hours)		No. of hours
Calculation	lecture attendance or self-study	5
	participation in classes, laboratory classes, etc.	30
	preparation for classes, laboratoratory classes, projects, seminars, etc.	10-15
	working on projects, reports, etc.	10-15
	participation in student-teacher sessions related to the classes/seminar/project	10-15
	implementation of project tasks	10-15
	preparation for and participation in tests	5
	TOTAL:	90

Quantitative indicators	HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation	2.5	5
Student workload – practical activities	2.5	

Basic references	1. Chapra S.C., Raymond P.C: Numerical Methods for Engineers,6th Edition, McGraw-Hill, 2010 2. Hibbeler R. C.: Engineering Mechanics: Statics, 13th Edition, Prentice Hall, 2013 3. Hibbeler R. C.: Engineering Mechanics: Dynamics, 13th Edition, 4. Prentice Hall, 2013Palm W.J.: Introduction to Matlab for Engineers, 3th Edition, McGraw-Hill, Boston, 2011 5. Meriam J.L.,Kraige L.G.: Engineering Mechanics, DYNAMICS, 6 edition, Wiley, 2006
Supplementary references	Urroz G.: Numerical and Statistical Methods with SCILAB for Science and Engineering - Volume 2,Book Surge Publishing, 2001 Kaw A.K. [et al.]: NUMERICAL METHODS WITH APPLICATIONS, Online textbook
Organisational	Department of Mechanics and Applied Computer Science / Date of issuing the

unit conducting the course		**programme**
Author of the programme	**Hubert Grzybowski, Phd, Eng**	**31.01.2017**

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