COURSE DESCRIPTION CARD – SPECIMEN

<table>
<tr><td colspan="10">Faculty of Mechanical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6">Mechanical Engineering</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">CAD&M</td><td colspan="2">Study profile</td><td></td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Finite element method</td><td colspan="2">Course code</td><td>IS-MER0025W</td></tr>
<tr><td colspan="2">Course type</td><td>elective</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, strength of materials I, mechanics I</td></tr>
<tr><td>Course objectives</td><td colspan="9">The structure and functions of the FEM. Calculation and modelling 1 dimensional elements: rods, truss,
beams, frames. Methods for creating, transforming and processing models in FEM systems.</td></tr>
<tr><td>Course content</td><td colspan="9">Elements of matrix analysis. The use of the finite element method for modeling the strength of the rod elements, such as: rods, beam, truss, frames.
Calculation procedure for FEM. Total strain energy using in FEM. Type of local stiffness matrix. Local and congruent loading. Internal loading in rods elements. Example of application for plane and space truss, and beams using FEM.
Example of application fo plane flame. Practical analysis of
structural mechanics problems using FEM based on available programs at the university.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">lecture, project</td></tr>
<tr><td>Assessment method</td><td colspan="9">lecture – written exam;
project – two 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">has basic knowledge to perform calculations using the FEM in rod problems</td><td colspan="2">M1_W04, M1_W05</td></tr>
<tr><td>LO2</td><td colspan="7">he can perform static analysis using FEM for rod systems.</td><td colspan="2">M1_U10</td></tr>
<tr><td>LO3</td><td colspan="7">he can present the results in the form of presentation</td><td colspan="2">M1_U04</td></tr>
<tr><td>LO4</td><td colspan="7">can verify results obtained from FEM calculation</td><td colspan="2">M1_U19</td></tr>
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LO5	can analyse the stiffness and the strength of the rod systems using FEM calculation	M1_U07
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	L
LO3	presentation and discussion	L, P
LO4	presentation and discussion	P
LO5	solving rod systems with the numerical calculation	P
LO6		

Student workload (in hours)		No. of hours
Calculation	lecture attendance	30
	participation in classes, laboratory classes, etc.	30
	preparation for classes, laboratoratory classes, projects, seminars, etc.	15
	working on projects, reports, etc.	20
	participation in student-teacher sessions related to the classes/seminar/project	15
	implementation of project tasks	30
	preparation for and participation in exams/tests	10
	TOTAL:	150

Quantitative indicators	HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation	75	2
Student workload – practical activities	75	3

Basic references	1. Zienkiewicz O.C., Taylor R.L.: The finite element method, T. 1-2, Mc Graw - Hill, London, 1989 - 1991. 2. Zienkiewicz O.C., Taylor R.L.: The finite element method, T. 1-3, Butterworth Heinemann, Oxford, 2000. 3. Krishnamoorthy C. S., Finite Element Analysis: Theory and Programming,Tata McGraw-Hill Education, 1994. 4. Reddy J., An Introduction to the Finite Element Method, Hardcover, 2005
Supplementary references	1. www.mscsoftware.com 2. Hutton D., Fundamental of Finite Element Analysis ,The McGraw−Hill, 2004

Organisational unit conducting the course	Department of Mechanics and Applied Computer Science	Date of issuing the programme
Author of the programme	Łukasz Derpeński, DSc, PhD, Eng	12.05.2021r.

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