MODULE DESCRIPTION

Module code	full-time studies:	**Z-ZIP1-E-502**
	part-time studies:	**Z-ZIPN1-E-502**
Module name	**Materials Strength - Laboratory**	
Module name in Polish	**Laboratorium z wytrzymałości materiałów**	
Valid from academic year	**2019/2020**	

MODULE PLACEMENT IN THE SYLLABUS

Field of study	**MANAGEMENT AND PRODUCTION ENGINEERING**
Level of education	**1st degree**
Studies profile	**General**
Form and method of conducting classes	**Full-time and Part-time**
Specialisation	**All**
Unit conducting the module	**Department of Computer Science Technologies**
Module co-ordinator	**Paweł Stąpór, PhD**
Approved by:	**Dariusz Bojczuk, PhD, DSc**

MODULE OVERVIEW

Type of subject / group of subjects	**Major**
Module status	**Compulsory**
Language of conducting classes	**English**
Module placement in the syllabus - semester	**Semesetr V**
Initial requirements	**Materials Strength**
Examination (YES/NO)	**NO**
Number of ECTS credit points	**1**

Method of conducting classes		**Lecture**	**Classes**	**Laboratory**	**Project**	**Other**
Per semester	full-time studies:			**15**		
	part-time studies:			**9**		

TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

Category	Symbol	Learning outcomes	Assignations to the directional learning outcomes
Skills	U01	A student has knowledge as regards creating and analysing engineering projects using programs of the finite elements method.	ZIP1_U17
	U02	A student is able to utilise the learnt mathematical methods and computer simulations in the process of analysing and assessing manufacturing decisions.	ZIP1_U19
Social competences	K01	A student understands the necessity and knows the possibilities of continuous self-betterment, which leads to raising his/her professional and personal competences.	ZIP1_K01

TEACHING CONTENTS

Method of conducting classes	Teaching contents
Laboratory	Introduction to the ABAQUS / CAE system. Determination of stresses in a plane truss (building a model with truss elements, discretization, solution, analysis of results). Hooke's law for a uniaxial stress state. Determination of cross-sectional stresses in beam elements (building a model with beam elements, diagrams of bending moments and shear forces). Verification of the stiffness principle by analyzing a geometrically nonlinear task. Static analysis of a disc with a hole, determination of displacements, strain and stress distributions (two-dimensional problem of the linear theory of elasticity, three and four node disc elements). Mises's strength hypothesis for a plane stress state. Illustration of the principles of de Saint Venant and Bernoulli. Introduction of the model of elastic-plastic material to the analysis of stresses in the disc (incremental analysis). Parameters of the elastic-plastic model: yield point, plastic strain. Critical load and buckling modes of flat frame members. Numerical verification of Euler's formula for the critical force.

METODS OF ASSESSING TEACHING RESULTS

Symbol	Methods of checking the learning outcomes *(select X)*					
	Oral exam	Written exam	Test	Project	Statement	Other
U01			X			
U02			X			
K01						X

FORM AND CONDITIONS OF PASSING

Form of classes	Form of credit	Passing conditions
Laboratory	Credit with grade	Obtaining at least 50% of test points during the class

STUDENT WORKLOAD

Balance of ECTS points												
No.	Type of student's activity	Student's workload										Unit
		full-time					part-time					
1.	Participation in the activities	Lc	C	Lb	P	O	Lc	C	Lb	P	O	h
				15					9			
2.	Other (consultation, exam)			2					2			h
3.	**Number of hours of a student's assisted work**	**17**					**11**					h
4.	**Number of ECTS credit points which are allocated for assisted work**	**0,7**					**0,4**					ECTS
5.	**Number of hours of a student's unassisted work**	**8**					**14**					h
6.	**Number of ECTS credit points which a student receives for unassisted work**	**0,3**					**0,6**					ECTS
7.	**Work input connected with practical classes**	**25**					**25**					h
8.	**Number of ECTS credit points which a student receives for practical classes**	**1,0**					**1,0**					ECTS
9.	**Total number of hours of a student's work**	**25**					**25**					h
10.	**Punkty ECTS za moduł** *1 ECTS=25 hours*	**1**										ECTS

LITERATURE

1. *Dassault Systemes Simulia Inc., Abaqus Analysis User's Guide, USA,* 2022.
2. Lee R. (2019), *ABAQUS for Engineers: A Practical Tutorial Book*, Independently published.
3. Lodder M. (2022), *Strength of Materials*, Springer International Publishing AG.