COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Bialystok University of Technology</td></tr>
<tr><td>Field of study</td><td colspan="5">Civil Engineering</td><td colspan="2">Degree level and programme type</td><td>Bechelor’s degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="5">-</td><td colspan="2">Study profile</td><td>academic profile</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="5" rowspan="2">Strength of materials (E)</td><td colspan="2">Course code</td><td>19282101H-1</td></tr>
<tr><td colspan="2">Course type</td><td>obligatory</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>3</td></tr>
<tr><td>16</td><td></td><td>16</td><td>16</td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>3</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Static & Dynamic Mechanics, Statics</td></tr>
<tr><td>Course objectives</td><td colspan="9">Students become familiar with the mechanical properties of basic construction materials. Students can identify strength cases (axially loaded members, pure bending, shearing, torsion, eccentric compression / tension, complex bending and shearing, column buckling), analyze stresses and deformations of bar elements. Students become familiar with the relationships between deformations and stresses.</td></tr>
<tr><td>Course content</td><td colspan="9">Lecture: Mechanical properties of materials, simple and complex strength cases: axially loaded members, pure bending, shearing, torsion, eccentric compression / tension, complex bending and shearing, column buckling. Relationships between deformations and stresses.
Project :
Project 1 : axially loaded members and torsion of shafts – statically determinate and indeterminate cases,
Project 2 : bending and shearing of beams – beams design with respect to the normal and shear stress, normal stress and shear stress diagrams , eccentric compression/tension – the core of the section.
Laboratory: laboratory tests of mechanical properties of construction materials; illustration of the laws of mechanics using the physical models. Laboratory tests:
1. Static standard tensile test of plain steel,
2. Static tensile test of non-yielding material,
3. Compression test of steel, cast iron and wood,
4. Torsion test of circular shaft,
5. Determination of beam deflection involving the superposition principle.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Informative lecture, solving practical problems, discussion on the project, performing laboratory test</td></tr>
<tr><td>Assessment method</td><td colspan="9">Lecture – written exam (test), project - discussion on the project, assessment of student’s activity, laboratory – reports, test</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 knowledge about the strength of materials and the general principles of designing of building structures elements.</td><td colspan="2">K_B1_W03</td></tr>
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LO2	Student knows simple and complex strength cases - the principles of analysis, modeling and designing of construction elements. Student can design basic structure elements.	K_B1_W05 K_B1_U06
LO3	Student knows the physical and mechanical properties of materials used in construction and testing methods. He can carry out basic strength tests.	K_B1_W01 K_B1_U05
LO4	Student can critically assess his knowledge in the field of strength of materials.	K_B1_K01
Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	Lecture – written exam (test),	L
LO2	Lecture – written exam (test), project – discussion and assessment of student's activity,	L, P
LO3	Lecture – written exam (test), project – discussion and assessment of student's activity, laboratory - reports, test	L, P, LC
LO4	Lecture – written exam (test), project – discussion and assessment of student's activity,	L,P
Student workload (in hours)		**No. of hours**
Calculation	lecture attendance	16
	participation in project and laboratory classes	32
	preparation for laboratory classes and laboratory raports	7
	participation in student-teacher sessions related to the course	3
	Solving project tasks	7
	preparation for exam and participation in it	10
	TOTAL:	75

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	53	2,12
Student workload – practical activities	49	1,96

Basic references	1. R. Subramanian: Strength of Materials, Oxford University Press, 2010. 2. Surya N. Patnaik Dale A Hopkins Hopkins,Dale; Surya Hopkins,Dale Patnaik: Strength of Materials, 2003. 3. Sarjit S Rattan: Strength of materials, McGraw-Hill Education, 2019. 4. Vitor Dias Silva: Mechanics and Strength of Materials, Springer Berlin Heidelberg, 2006.
Supplementary references	1. G.N.Frantziskonis: Essentials of the mechanics of materials, DEStech Publications, 2013. 2. Dyląg Z., Jakubowicz A.: Orłoś Z. Wytrzymałość materiałów T 1., WNT 2007 (in polish) 3. Jastrzębski P., Mutermilch J., Orłowski W.: Wytrzymałość materiałów, cz.1 i cz.2., Arkady, 1985, (in polish) 4. Wiesław Bandyszewski, Monika Mackiewicz, Wojciech Szczepkowski: Wybrane zagadnienia z wytrzymałości materiałów : przykłady obliczeń, Państwowa Wyższa Szkoła Zawodowa im. prof. Edwarda F. Szczepanika w Suwałkach, 2010 (in polish)

Organisational unit conducting the course	Department of Geotechnics and Structural Mechanics	**Date of issuing the programme**
Author of the programme	**Phd. Eng. Joanna Krętowska**	27.08.2022

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