

Name of the subject				Subject code		Year / semester		
<b>Strength of Materials in Civil Engineering</b> <i>Wytrzymałość materiałów w budownictwie</i>						<b>II</b>	<b>01</b>	
Subject		Profile		Level of education				
<b>Obligatory</b>		<b>General academic</b>		<b>Full-time, first degree – S1</b>				
Type of classes						ECTS		
Lecture	Exercises	Laboratory	Project	Seminar	Exam			
<b>15</b>	<b>30</b>	<b>-</b>	<b>15</b>	<b>-</b>	<b>-</b>	<b>6</b>		
Department conducting subject:	<b>Department of Civil Engineering</b> <b>Tel: +48 (34) 325 09 50</b>						<b>mail: damian.jonczyk@pcz.pl</b>	
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<b>I. Card subject</b>	
<b>PURPOSE OF THE SUBJECT</b>	
<b>C01</b>	A basic understanding of the behavior of common structural forms, based on a physical understanding of how these forms are able to carry external forces through the development of internal forces in structural elements.
<b>C02</b>	The ability to derive stress and strain distributions within basic structural members.
<b>PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES</b>	
<b>1</b>	Knowledge in the field of Classical Mechanics
<b>2</b>	Knowledge in the field of Engineering Mathematics (Linear Algebra and Differential Equations)
<b>EDUCATIONAL EFFECTS:</b>	
<b>Knowledge: the graduate knows and understands</b>	
<b>EK1</b>	conceptual links between structural and solid mechanics, concepts of designing for strength and deformation limits, how beams and frames resist external forces.
<b>Skills: the graduate can</b>	
<b>EK2</b>	determine: the internal forces in statically determinate beams and frames, the stresses within simple elements and cross-sections, deflections in simple beams.
<b>Social competence: the student is ready to</b>	
<b>EK3</b>	work individually and in team.

<b>PROGRAM CONTENT</b>		
<b>Type of classes - Lecture</b>		<b>Number of hours</b>
<b>L1</b>	Introduction. Review of Equilibrium	1
<b>L2</b>	Stress and Strain. Mechanical Properties of Materials	1
<b>L3</b>	Axial Load	1
<b>L4</b>	Torsion	1
<b>L5</b>	Constraints and Statical Determinacy	1
<b>L6</b>	Shear Force and Bending Moment Diagrams	1
<b>L7</b>	Moments of Inertia	1
<b>L8</b>	Bending	1
<b>L9</b>	Transverse Shear	1
<b>L10</b>	Deflection of Beams – Elastic Curve	1
<b>L11</b>	Deflection of Beams – Energy Methods	1
<b>L12</b>	Unsymmetric Bending. Combined Loadings	1
<b>L13</b>	Cross-section Core	1

L14	Buckling of Columns	1
L15	Quiz	1
<b>TOTAL:</b>		<b>15</b>

PROGRAM CONTENT		
Type of classes - Exercise		Number of hours
E1	Introduction. Review of Forces, Moments	2
E2	Axial Loading – Statically Determinate Bars	2
E3	Axial Loading – Statically Indeterminate Problems	2
E4	Torsion	2
E5	Shear Force and Bending Moment Diagrams in Beams	4
E6		
E7	Shear Force and Bending Moment Diagrams in Frames	2
E8	Quiz no. 1	2
E9	Normal and Shear Stresses in Beam	2
E10	Deflection of Beams	4
E11		
E12	Unsymmetric Bending. Combined Loadings	2
E13	Cross-section Core	2
E14	Column Buckling	2
E15	Quiz no. 2	2
<b>TOTAL:</b>		<b>30</b>

PROGRAM CONTENT		
Type of classes - Project		Number of hours
P1	Introduction. General Information about Project	1
P2	Review of Statics	2
P3		
P4	<b>Project.</b> Individual Assumptions	1
P5	<b>Project.</b> Shear Force and Bending Moment Diagrams	3
P6		
P7		
P8	<b>Project.</b> Normal and Shear Stresses	2
P9		
P10	<b>Project.</b> Deflection	3
P11		
P12		
P13	<b>Project.</b> Cross-section Core	1
P14	Introduction to Structural Design	1
P15	Review	1
<b>TOTAL:</b>		<b>15</b>

BASIC AND ADDITIONAL LITERATURE	
<b>Basic literature:</b>	
1.	Hibbeler R. C., <i>Mechanics of Materials</i> , Pearson, 2017.
2.	Goodno B. J., Gere J. M., <i>Mechanics of Materials</i> , Cengage Learning, 2018.
<b>Additional literature:</b>	

1.	Timoshenko S., <i>Strength of Materials, Part I – Elementary Theory and Problems</i> , D. Van Nostrand Company, 1940.
2.	Gross D., Hauger W., Schröder J., Wall W. A., Bonet J., <i>Engineering Mechanics 2 - Mechanics of Materials</i> , Springer, 2017.
3.	Ghavami P., <i>Mechanics of Materials - An Introduction to Engineering Technology</i> , Springer, 2015.
4.	Dias da Silva V., <i>Mechanics and Strength of Materials</i> , Springer, 2006.
5.	Roylance D., <i>Modules in Mechanics of Materials</i> , < <a href="http://web.mit.edu/course/3/3.11/www/module_list.html">http://web.mit.edu/course/3/3.11/www/module_list.html</a> >.
6.	Bucciarelli L., <i>Engineering Mechanics for Structures</i> < <a href="https://ocw.mit.edu/courses/civil-and-environmental-engineering/1-050-solid-mechanics-fall-2004/readings/">https://ocw.mit.edu/courses/civil-and-environmental-engineering/1-050-solid-mechanics-fall-2004/readings/</a> >.