



## Subject card

Subject name and code	Structural Composites, PG_00040229						
Field of study	Civil Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2022/2023		
Education level	second-cycle studies	Subject group					
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Katedra Wytrzymałości Materiałów -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jacek Chróścielewski					
	Teachers	dr hab. inż. Agnieszka Sabik dr inż. Łukasz Pyrzowski prof. dr hab. inż. Jacek Chróścielewski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	15.0	0.0	0.0	45
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours		Self-study	SUM	
	Number of study hours	45	2.0		8.0	55	
Subject objectives	Familiarizing students with selected aspects of the use of polymer structural composites in civil engineering.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W01] has knowledge of higher mathematics, physics and chemistry, which is a base of subjects, such as construction theory and advanced material technology	The student understands the theoretical basis of the theory used in the analysis of layered composites.			[SW1] Assessment of factual knowledge		
	[K7_U06] is able to choose proper tools (measuring, analytical or numerical) to solve engineering problems, to acquire, filtrate, proces and analyse data	The student can assess the usefulness of various measuring techniques for material research and numerical FEM techniques for solving specific problems.			[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
Subject contents	Introduction, classification and components of composites Production of polymer composites Fundamentals of layered composites modeling: layer mechanics, classic laminate theory, first order shear theory Identification of material parameters, tests and mixing rules Failure criteria for laminated composites Designing of composite structures The use of structural composites in civil engineering						
Prerequisites and co-requisites	BSP015 Wytrzymałość materiałów BSP020 Mechanika budowli BSP021 Metody obliczeniowe BSP022 Komputerowa analiza konstrukcji						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Final assigment		60.0%		100.0%		

Recommended reading	Basic literature	<p>KRÓLIKOWSKI W. (2012): Polimerowe kompozyty konstrukcyjne. Wydawnictwo Naukowe PWN, Warszawa 2012.</p> <p>GERMAN J. (2001): Podstawy mechaniki kompozytów włóknistych. Politechnika Krakowska, Kraków 2001.</p> <p>BOCZKOWSKA A., KAPUŚCIŃSKI J., PUCIŁOWSKI K., WOJCIECHOWSKI S. (2000): Kompozyty. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2000.</p> <p>JONES R.M. (1999): Mechanics of Composite Materials. Taylor &amp; Francis, Inc..</p> <p>ASHBY M.F., JONES D.R.H. (1995): Materiały inżynierskie 1, Właściwości i zastosowania. WNT, Warszawa.</p> <p>ASHBY M.F., JONES D.R.H. (1980): Materiały inżynierskie 2. Kształowanie struktury i właściwości, dobór materiałów. WNT, Warszawa.</p> <p>ASHBY M., SHERCLIFF H., CEBON D. (2011): Inżynieria Materiałowa. Tom 1 i 2. Wydawnictwo Galaktyka, Łódź.</p> <p>ASHBY M.F., JONES D.R.H. (1980): Engineering Materials 1. An Introduction to their Properties and Applications. Pergamon.</p> <p>ASHBY M.F., JONES D.R.H. (1980): Engineering Materials 2. An Introduction to Microstructures, Processing and Design. Butterworth-Heinemann Ltd.</p>
	Supplementary literature	SP Systems Guide to Composites
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>Analysis of the fiber orientation on the deformation of the laminate in tension</p> <p>Simulation of laminate bending test</p> <p>Stability analysis of axially compressed laminate</p> <p>The use of composite materials in construction - a review</p>	
Work placement	Not applicable	