



Subject card

Subject name and code	Design Patterns, PG_00060229						
Field of study	Technical Physics						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2028/2029	
Education level	first-cycle studies	Subject group				Optional subject group Subject group related to scientific research in the field of study	
Mode of study	Full-time studies	Mode of delivery				at the university	
Year of study	3	Language of instruction				Polish	
Semester of study	6	ECTS credits				3.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Department of Theoretical Physics and Quantum Computing -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Bartosz Reichel					
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	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		5.0		25.0	75
Subject objectives	The student will know the selected object design patterns, and some connected programming techniques. Will be able to use them in programs.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W05] has knowledge of programming methodologies and techniques, as well as the use of selected IT tools in physics and engineering.	Can model physics problems in the form of code using object-oriented patterns (e.g. numerical methods)			[SW1] Assessment of factual knowledge		
	[K6_U02] is able to analyse and solve complex and non-standard scientific and technical problems using appropriate analytical, computational, numerical, simulation or experimental methods.	Can implement simple tasks using design patterns. Applies appropriate patterns to a given technical problem.			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	[K6_U03] possesses programming skills in a selected language and the ability to use selected software packages.	Can use design patterns in selected packages that support design patterns. Has the ability to assess the limitations of a chosen programming language.			[SU1] Assessment of task fulfilment		

Subject contents	<p>Course content – lecture</p> <p>Discussed in lectures are creative patterns: Singleton, Factory Method, Prototype, Abstract Factory, Builder, Structural patterns: Proxy, Adapter, Facade, Bridge, Composite, Decorator, Flyweight, and functional patterns: Template Method, Memento, Command, Iterator, Observer, Strategy, State, Visitor. In addition, be submitted to the library collections of the standard C++ and Java, and input / output operations in C++ and Java. The present model is a design pattern Model - View - Coordinator.</p> <p>During the laboratory exercises, students develop software using these techniques.</p>		
	<p>Course content – laboratory Implementation:</p> <p>Task #1 (Binary Search) Task #2 (Observer, Singleton) Task #3 (Decorator) Task #4 (Strategy) Task #5 (Substitute) Task #6 (Command, Souvenir) - 2 weeks Task #7 (Substring Generation - Abstract Factory) Task #8 (Chain of Responsibility) Task #9 - DI/IOC Task #10 - Thread Pool Task #11 - Barrier</p>		
Prerequisites and co-requisites	Basic knowledge of programming in C++ and Java. Knowledge of basic algorithms and data structures.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	50.0%	100.0%
Recommended reading	Basic literature	E. Gamma, R. Helm, R. Johnson, J. Vlissides (the Gang of Four) "Design Patterns", Addison-Wesley, 1994	
		B. Eckel "Thinking in Patterns", dostępna za darmo w Internecie	
	Supplementary literature	None	
	eResources addresses		
Example issues/ example questions/ tasks being completed	The project utilizing design patterns		
Practical activities within the subject	Not applicable		

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