GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Design Patterns, PG_00060229		
Field of study	Technical Physics		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2027/2028
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_U02] analyzes and solves simple scientific and technical problems, based on possessed knowledge, using analytical, numerical, simulation and experimental methods	Can implement selected issues	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K6_U03] knows programming languages and can use basic software packages	Can implement selected issues	[SU1] Assessment of task fulfilment
[K6_W05] has knowledge of programming methodology and techniques, and the use of selected IT tools in physics and technology	Can model physics problems in the form of code using object-oriented patterns (e.g. numerical methods)	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>Course content – lecture
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.

During the laboratory exercises, students develop software using these techniques.

Course content – laboratory
Implementation:

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</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of programming in C + + and Java. Knowledge of basic algorithms and data structures.</td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Project</td><td>50.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>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</td></tr><tr><td>Supplementary literature</td><td>None</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>The project utilizing design patterns</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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