GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Object-oriented programming languages II, PG_00037343
Field of study	Technical Physics

Date of commencement of studies	October 2020	Academic year of realisation of subject	2021/2022
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	2	Language of instruction	Polish
Semester of study	4	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Department of Theoretical Physics and Quantum Information -> Faculty of Applied Physics and Mathematics

Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. arch. Jan Kozicki
	Teachers	dr hab. inż. arch. Jan Kozicki

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	45.0	0.0	0.0	60
	E-learning hours included: 0.0						
	Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=9210 Adresy na platformie eNauczanie: Obiektowe języki programowania II 2021/2022 sem.letni - Moodle ID: 19728 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=19728						

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	60	10.0	55.0	125

Subject objectives	Student learns object-oriented programming in the selected programming language (C++ ISO/ANSI, C++14, C++17).

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_U03	Has knowledge of programming in C++ language along with the standard library STL.	[SU1] Assessment of task fulfilment
	K6_W05	Has fundamental knowledge and programming skills necessary to use them with with other IT tools used in physics and in technical applications.	[SW1] Assessment of factual knowledge
	K6_K01	Student understands the need to search for new and better libraries for the programming language. Using new technologies and tracking the evolution of the languages in present standard C++17 and future standard C++21.	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents	The basic elements of object-oriented design
	Reuse of code
	Analysis of Object
	Abstract data types
	Classes and Objects
	Memory management
	Mechanisms of inheritance
	Exception handling
	Object-oriented design methodology
	The use of object-oriented techniques in different programming languages
Prerequisites and co-requisites	Knowledge of operating systems Unix/Linux and MS Windows. Knowledge of the courses Procedural Programming Languages I (FIZ1C301) and II (FIZ1C307). Knowledge of the course Object-Oriented Programming Languages I (FIZ1C305).

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	A written knowledge test of the lecture material	50.0%	20.0%
	Programming project - C++	50.0%	20.0%
	Test of practical programming skills (C ++ ISO / ANSI).	50.0%	20.0%
	Weekly short assignments based on lecture material from each week.	50.0%	20.0%
	Very short tests of the practical skills of programming	50.0%	20.0%

Recommended reading	Basic literature	1) B. Stroustrup Programming Principles and Practice using C++, Addison Wesley
	Supplementary literature	1. B. Meyer Object oriented software construction 2nd Ed.Prientice Hall PTR
	eResources addresses	Obiektowe języki programowania II 2021/2022 sem.letni - Moodle ID: 19728 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=19728

Example issues/ example questions/ tasks being completed	1. Create a vector of Fibonacci numbers and print them using the functionfrom exercise 2. To create the vector, write a function, fibonacci(x,y,v,n),where integers x and y are ints, v is an empty vector, and n is thenumber of elements to put into v; v[0] will be x and v[1] will be y. A Fibo-nacci number is one that is part of a sequence where each element is thesum of the two previous ones. For example, starting with 1 and 2, we get1, 2, 3, 5, 8, 13, 21, ... Your fibonacci() function should make such asequence starting with its x and y arguments.
	2. Define an Order class with (customer) name, address, data, andvector members. Purchase is a class with a (product) name,unit_price, and count members. Define a mechanism for reading andwriting Orders to and from a file. Define a mechanism for printing Or-ders. Create a file of at least ten Orders, read it into a vector, sortit by name (of customer), and write it back out to a file. Create anotherfile of at least ten Orders of which about a third are the same as in the firstfile, read it into a list, sort it by address (of customer), and writeit back out to a file. Merge the two files into a third using std::merge().
	3. Write a binary search function for a vector (without using the standard one). You can choose any interface you like. Test it. How confidentare you that your binary search function is correct? Now write a binarysearch function for a list. Test it. How much do the two binarysearch functions resemble each other? How much do you think theywould have resembled each other if you had not known about the STL?
	4. Modify the calculator from Chapter 7 minimally to let it take input froma file and produce output to a file (or use your operating systems facilitiesfor redirecting I/O). Then devise a reasonably comprehensive test for it.
	5. What are the advantages and disadvantages of intrusive containers com-pared to C++ standard (non-intrusive) containers? Make lists of prosand cons.
	6. Make a window (based on My_window) with a 4-by-4 checkerboard ofsquare buttons. When pressed, a button performs a simple action, such asprinting its coordinates in an output box, or turns a slightly different color(until another button is pressed).
	7. explain keywords "this" and "constexpr"
	8. what is the difference between static polymorphism and dynamic polymorphism. Explain with a code example using keywords "typename" and "virtual".
Work placement	Not applicable