SYLLABUS OF A MODULE

Polish name of a module	**Wprowadzenie do algorytmów i programowania**
English name of a module	**Introduction to algorithms and programming**
ISCED classification - Code	0613
ISCED classification - Field of study	*Software and applications development and analysis*
Languages of instruction	*English*
Level of qualification: ***1 – BSc (EQF 6)*** ***2 – MSc (EQF 7)*** ***3 – PhD (EQF 8)***	*2*
Number of ECTS credit points	*5*
Examination: ***EO – exam oral*** ***EW – exam written*** ***A - assignment***	*EW*
Available in semester: ***S – Spring only*** ***A – autumn only*** ***Y - booth***	*S*

Number of hours per semester:

Lecture	Exercises	Laboratory	Seminar	E-learning	Project
30	15	30	0	0	0

MODULE DESCRIPTION

MODULE OBJECTIVES

O1. Obtaining knowledge in the basic methods of programming using object-oriented programming languages.

O2. Familiar with programming tools, environment, optimization techniques, methods of adaptation of codes to computing platforms

O3. Obtaining knowledge in the area of developing and implementing selected algorithms

O4. Acquisition by students practical skills to work independently and in a team, develop reports, analyze the results, etc.

PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of mathematics.
2. Basics of computer skills.
3. Rational and logical thinking.
4. Ability to perform mathematical operations to solve given tasks.
5. Ability to use various sources of information including manuals and technical documentation.

6. Ability to work independently and in a group.
7. Ability to correctly interpret and present their own actions

LEARNING OUTCOMES

LO 1 – able to use an object-oriented programming language

LO 2 – able to develop and implement a given algorithm

LO 3 – able to solve a mathematical problem by developing an appropriate algorithm

LO 4 – able to use programming tools including compilers, debuggers, and profilers,

LO 5 – able to work independently and in a team, develop and analyze reports

MODULE CONTENT

Type of classes – lecture	**Number of hours**
Lec 1 Introduction to C++ Programming	**2**
Lec 2 Built-in Data Types	**2**
Lec 3 Common Strings Operations	**2**
Lec 4 Loops, Nested Loops, and Functions	**2**
Lec 5 Reference, Parameters, and Pointers	**2**
Lec 6 Arrays, and Dynamic Memory Management	**2**
Lec 7 File Streams	**2**
Lec 8 Structs and Classes	**2**
Lec 9 Class Implementation	**2**
Lec 10 Functions and Classes Templates	**2**
Lec 11 Introduction to Algorithms	**2**
Lec 12 Complexity of the Algorithms	**2**
Lec 13 Presentation of Selected Algorithms	**2**
Lec 14 Performance analysis for Selected Algorithms	**2**
Lec 15 Techniques of Optimizations	**2**
Sum	**30**
Type of classes – exercises	**Number of hours**
Ex 1 - Introduction to Programming and Algorithms	**1**
Ex 2 - Bits, Data Types, and Operations	**1**
Ex 3 - Internal Representation of Fixed Point Data Types	**1**
Ex 4 - Internal Representation of Floating Point Data Types	**1**
Ex 5 - Logical Operations	**1**
Ex 6 - Bits Operations	**1**
Ex 7 - Reference, Parameters, and Pointers	**1**
Ex 8 - Multi Dimensional Computation	**1**
Ex 9 - Multi Dimensional Computation	**1**
Ex 10 - Memory Management	**1**
Ex 11 - Computation Management	**1**
Ex 12 - Complexity of the Algorithms	**1**

Ex 13 - Theoretical Performance Models	**1**
Ex 14-15 - Performance analysis for Selected Algorithms	**2**
Sum	**15**
Type of classes – laboratory	**Number of hours**
Lab 1 Introduction to Compilers, Coding, and Programs Execution	**2**
Lab 2 Using Built-in Data Types	**2**
Lab 3 Application of Common Strings Operations	**2**
Lab 4 Loops, Nested Loops, and Functions	**2**
Lab 5 Reference, Parameters, and Pointers	**2**
Lab 6 Arrays, and Dynamic Memory Management	**2**
Lab 7 File Streams	**2**
Lab 8 Structs and Classes	**2**
Lab 9 Class Implementation	**2**
Lab 10 Functions and Classes Templates	**2**
Lab 11 Implementation of Selected Algorithms	**2**
Lab 12 Implementation of Selected Algorithms	**2**
Lab 13 Implementation of Selected Algorithms	**2**
Lab 14 Techniques of Computation Optimizations	**2**
Lab 15 Techniques of Memory Optimizations	**2**
Sum	**30**

TEACHING TOOLS

1. – instructions for laboratories
2. – wide range of algorithm and programming tools
3. – workplaces for students equipped with workstations

WAYS OF ASSESSMENT (F – FORMATIVE, S – SUMMATIVE)

S1. - assessment of the ability to solve the problems posed and the manner of presentation obtained results - pass mark *
S2. - assessment of mastery of the teaching material being the subject of the exercises

*) in order to receive a credit for the module, the student is obliged to attain a passing grade in all laboratory classes as well as in achievement tests.

STUDENT'S WORKLOAD

L.p.	Forms of activity	Average number of hours required for realization of activity
1. Contact hours with teacher		
1.1	Lectures	30
1.2	Tutorials	15
1.3	Laboratory	30
1.4	Seminar	

1.5	Project	
1.6	Examination	
	Total number of contact hours with teacher:	75
2. Student's individual work		
2.1	Preparation for tutorials and tests	10
2.2	Preparation for laboratory exercises, writing reports on laboratories	13
2.3	Preparation of project	
2.4	Preparation for final lecture assessment	
2.5	Preparation for examination	13
2.6	Individual study of literature	13
	Total number of hours of student's individual work:	49
	Overall student's workload:	125
Overall number of ECTS credits for the module		5 ECTS
Number of ECTS points that student receives in classes requiring teacher's supervision:		3.04 ECTS
Number of **ECTS** credits acquired during practical classes including laboratory exercises and projects:		1.8 ECTS

BASIC AND SUPPLEMENTARY RESOURCE MATERIALS

1. Bruce Eckel, "Thinking in C++: Introduction to Standard C++", Prentice Hall, 2008
2. Bruce Eckel, Thinking In C++: Practical Programming, Prentice Hall, 2009
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, The Mit Press, 2009

MODULE COORDINATOR (NAME, SURNAME, E-MAIL ADDRESS)

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