Course catalogue for incoming Erasmus+ students

Computer sciences

2025/2026

Course title	Semester	ECTS	Lecture	Lab	Project
Fundamentals of Computer Science I	winter	6	15	30	30
Group Project	winter	6	0	0	75
Programming Strategies I	winter	6	15	30	30
Programming Strategies II	winter	6	15	30	30
Computer Networks I	winter	6	15	30	30
Applications of Computer Graphics	winter	6	0	30	45
Fundamentals of Computer Science II	summer	6	15	30	30
Programming Strategies III	summer	6	15	30	30
Programming Strategies IV	summer	6	15	30	30
Programming Strategies V	summer	6	15	30	30
Fundamentals of Machine Learning	summer	6	15	30	30
Computer Networks II	summer	6	15	30	30
Fundamentals of Computer Graphics	summer	6	15	30	30

Winter semester

STATE UNIVERSITY OF APPLIED SCIENCES IN GŁOGÓW

INSTITUTE OF ENGINEERING AND TECHNICAL SCIENCES

SYLLABUS / COURSE DESCRIPTION

BASIC INFORMATION ABOUT THE SUBJECT			
Name of the subject (module)	**Fundamentals of Computer Science I**	Course code	**17**

Name of the unit teaching the subject	**Institute of Engineering and Technology**		
Level of education	**First-cycle studies**	Profile	**Practical**
Field of study	**Computer Science**	Specialization	
Education module	**Field-specific**	Language of instruction	**English**
Semester	**I**	Form of assessment	**Pass with a grade**

HOURLY DIMENSION OF DIDACTIC CLASSES		
FULL-TIME STUDIES		
Lecture	Project	Laboratory
15	30	30

TOTAL HOURLY DIMENSION OF CLASSES	
Student's independent work	75
Total	**150**
ECTS	**6**

COURSE OBJECTIVE
The aim of the course is to present the properties of algorithms, the principles of algorithm design, the limitations associated with algorithm design, to present basic data structures and algorithms for handling them, and to develop the ability to design algorithms for selected algorithmic problems.

LEARNING OUTCOMES FOR THE COURSE		
CODE	**DESCRIPTION**	**LEARNING OUTCOME**
Knowledge		
W1	Can explain the principle of operation of algorithms for inserting, deleting, and searching for elements in a broad class of dynamic data structures, such as lists, binary trees, B-trees, and priority queues.	**INF1st_W3**
W2	Knows and can describe basic algorithms for solving selected algorithmic tasks (e.g., sorting, searching for a pattern in text, etc.)	**INF1st_W3**
Skills		
U1	Is able to propose an appropriately selected algorithmic technique for a specific classic algorithmic task (e.g., sorting, searching for a pattern in text, etc.)	**INF1st_U9 INF1st_U10**
U2	Is able to interpret algorithm flowcharts and develop them for simple algorithmic tasks.	**INF1st_U10**

EDUCATIONAL CONTENT	
TOPIC	
Lecture	
1	1. Algorithms and their properties: the concept of an algorithmic problem and an algorithm, properties of algorithms. Correctness and partial correctness of algorithms. The stop property. Computational complexity: memory, time.

2	2. Block diagrams, block descriptions, graphical representation of blocks, control structures.
3	3. Programming techniques: recursion and derecursion, divide and conquer programming, greedy algorithms, dynamic programming.
4	4. Data structures: concept of data structure, dynamic sets, linearly ordered sets, dictionary, queues, and stacks.
5	5. Sorting, internal sorting model, simple sorting algorithms, heap sorting, quick sort.
6	6. Single- and double-linked lists, circular lists, priority queues, maps.
7	7. Trees, binary search trees (BST), self-organizing structures, positional search trees.
8	8. Hash tables, hash functions, conflict prevention techniques; B-trees.
9	9. Sets and graphs: sets, directed and undirected graphs, graph representations, breadth-first and depth-first graph search, graph theory and network algorithms.
10	10. Analysis of selected algorithmic problems: linear and binary search, selection of the k-th element, pattern search in text.
Laboratory	
1	1. Presentation of the topics, schedule, and rules for passing the laboratory.
2	2. Analysis of algorithm properties.
3	3. Block diagrams, graphical representation of blocks. Drawing block diagrams for selected algorithmic problems.
4	4. Application of recursion, divide-and-conquer programming for selected algorithmic problems.
5	5. Arrays. Implementation of basic and complex array sorting algorithms. Analysis of the computational complexity of individual algorithms.
6	6. Implementation of dynamic data structures: linearly ordered sets, queues, and stacks.
7	7. Programming dynamic data structures: singly and doubly linked lists, circular lists, priority queues, maps.
8	8. Implementation of basic operations for tree structures, binary search trees (BST), B-trees.
9	9. Ordered trees, implementation of tree balancing based on recursive procedures.
10	10. Implementation of linear and binary search algorithms, element selection, pattern search in text.
11	11. Test correction. Summary and completion of exercises.
Project	
1	1. Defining the project task. Specification of the goal, assumptions, functional and non-functional requirements.
2	2. Defining the application structure. Defining (writing down) use cases.
3	3. Implementation of the designed solution.
4	4. Testing and corrections, and preparation of the final version of the project.
5	5. Preparation of project documentation. Project completion.

TEACHING METHODS

problem-based lecture, conventional lecture, case method, discussion, demonstration, laboratory exercises

ASSESSMENT CRITERIA

The final grade for the course is the arithmetic mean of all forms of classes.

Each form of class must be assessed positively.

Detailed information will be provided during the first class when the syllabus is presented.

VERIFICATION OF LEARNING OUTCOMES

CODE		DESCRIPTION	LEARNING OUTCOME
		Knowledge | **Lecture**	
W1	1	final test	**INF1st_W3**
W2	1	final test	**INF1st_W3**
		Skills | **Lecture**	
U1	1	report(s)	**INF1st_U9 INF1st_U10**
U2	1	report(s)	**INF1st_U10**
		Knowledge | **Laboratory**	
W1	1	oral response	**INF1st_W3**
W2	1	report(s)	**INF1st_W3**
		Skills | **Laboratory**	
U1	1	report(s)	**INF1st_U9 INF1st_U10**
U2	1	report(s)	**INF1st_U10**
		Knowledge | **Project**	
W1	1	Project	**INF1st_W3**
W2	1	Multimedia presentation	**INF1st_W3**

Skills		Project	
U1	1	oral response	INF1st_U9 INF1st_U10
U2	1	report(s)	**INF1st_U10**

ASSESSMENT FORMS

Assessment criteria according to the scale:

very good	**5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a very gooddegree
good plus	**4,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a more than good degree
good	**4**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a good degree
sufficient plus	**3,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a fairly good degree
satisfactory	**3**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a satisfactory degree
unsatisfactory	**3**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice
pass	**pass**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice
failed	**nzal**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice

LITERATURE

Basic

1	Piotr Wróblewski, Algorithms, Data Structures, and Programming Techniques. 6th edition, Helion 2019.
2	Stephen G. Kochan, The C Language: A Compendium of Knowledge, 4th edition, Helion 2015.
3	Feliks Kurp, Algorithms. Data Structures and Computational Complexity, Helion 2022.
4	Pks Prakash, Achyutuni Sri Krishna Rao, R Data Structures and Algorithms. Increase speed and performance of your applications with efficient data structures and algorithms, Packt Publishing 2016.

STATE UNIVERSITY OF APPLIED SCIENCES IN GŁOGÓW

INSTITUTE OF ENGINEERING AND TECHNICAL SCIENCES

SYLLABUS / COURSE DESCRIPTION

BASIC INFORMATION ABOUT THE SUBJECT			
Name of the subject (module)	**Group project**	Course code	**19**
Name of the unit teaching the subject	**Institute of Engineering and Technology**		
Level of education	**First-cycle studies**	Profile	**Practical**
Field of study	**Computer Science**	Specialization	
Education module	**Field-specific**	Language of instruction	**English**
Semester	**III**	Form of assessment	**Pass with a grade**

HOURLY DIMENSION OF DIDACTIC CLASSES		
FULL-TIME STUDIES		
Lecture	Project	Laboratory
0	75	0

TOTAL HOURLY DIMENSION OF CLASSES	
Student's independent work	75
Total	**150**
ECTS	**6**

PREREQUISITES

Fundamentals of Computer Science I

COURSE OBJECTIVE

LEARNING OUTCOMES FOR THE COURSE

CODE	DESCRIPTION	LEARNING OUTCOME
	Skills	
U1	Able to analyze problems and propose an appropriately selected algorithmic technique.	**INF1st_U1 INF1st_U2 INF1st_U3**
U2	Able to design and implement software in a high-level language in an object-oriented environment	**INF1st_U1 INF1st_U2 INF1st_U3**
U3	Is able to use project management support tools, e.g., project version control.	**INF1st_U1 INF1st_U2 INF1st_U3**
	Competencies	
K1	Is able to cooperate in a group project and applies the principles of effective communication of information to the group in a form understandable to those implementing the project.	**INF1st_K1**

EDUCATIONAL CONTENT

TOPIC	
Project	
1	Introduction to the project - presentation of the project task, definition of resources.
2	Division into project groups, distribution of responsibilities within the project team. Preparation of a work plan.
3	Implementation of the project task according to the agreed plan, including, for example: specification of requirements, development of UML diagrams, development of a test plan, etc.
4	Presentation of current progress, validation and verification of completed parts of the project.
5	Project integration. Presentation of the final version of the completed project and its evaluation.

TEACHING METHODS

Case studies, discussion, demonstration, project work

ASSESSMENT CRITERIA

The final grade for the course is the arithmetic mean of all forms of classes.
Each form of class must be assessed positively.
Detailed information will be provided during the first class when the syllabus is presented.

VERIFICATION OF LEARNING OUTCOMES

CODE		DESCRIPTION	LEARNING OUTCOME
		Skills | **Project**	
U1	1	Project	**INF1st_U1 INF1st_U2 INF1st_U3**
	2	report(s)	
U2	1	Project	**INF1st_U1 INF1st_U2 INF1st_U3**
	2	report(s)	
U3	1	Project	**INF1st_U1 INF1st_U2 INF1st_U3**
	2	report(s)	
		Competencies | **Project**	
K1	1	oral response	**INF1st_K1**
	2	report(s)	

ASSESSMENT FORMS

Assessment criteria according to the scale:

very good	**5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a very gooddegree
good plus	**4,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a more than good degree
good	**4**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a good degree
sufficient plus	**3,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a fairly good degree
satisfactory	**3**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a satisfactory degree
unsatisfactory	**3**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice
pass	**pass**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice
failed	**nzal**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice

LITERATURE

Basic

1	Literature indicated by the instructor related to the topics of the projects being implemented.

STATE UNIVERSITY OF APPLIED SCIENCES IN GŁOGÓW

INSTITUTE OF ENGINEERING AND TECHNICAL SCIENCES

SYLLABUS / COURSE DESCRIPTION

BASIC INFORMATION ABOUT THE SUBJECT			
Name of the subject (module)	**Programming strategies I**	Course code	**20**

Name of the unit teaching the subject	**Institute of Engineering and Technology**		
Level of education	**First-cycle studies**	Profile	**Practical**
Field of study	**Computer Science**	Specialization	
Education module	**Field-specific**	Language of instruction	**English**
Semester	**I**	Form of assessment	**Exam**

HOURLY DIMENSION OF DIDACTIC CLASSES		
FULL-TIME STUDIES		
Lecture	Project	Laboratory
15	30	30

TOTAL HOURLY DIMENSION OF CLASSES	
Student's independent work	75
Total	**150**
ECTS	**6**

COURSE OBJECTIVE

The aim of the course is to present the idea of structured programming, basic and complex data types. Presentation of the principles of program design in C, design and implementation of functions in C, and the application of programming techniques to solve selected algorithmic problems.

LEARNING OUTCOMES FOR THE COURSE

CODE	DESCRIPTION	LEARNING OUTCOME
	Knowledge	
W1	Knows and is able to describe the paradigms of structured programming in C.	**INF1st_W4**
	Skills	
U1	Is able to design and implement programs in C.	**INF1st_U6 INF1st_U11**
U2	Is able to design and implement dynamic data structures in C.	**INF1st_U6 INF1st_U11**

EDUCATIONAL CONTENT

TOPIC	
	Lecture
1	1. Introduction to the idea of structural programming, program structure in C.
2	2. Data types, constants and variables, operators, basic C language instructions
3	3. Complex instructions. Program control instructions. Conditional instructions if, if-else; switch selection instruction. Iterative instructions (loops): for, while, do-while.
4	4. Expressions and operators. Assignment operator, single- and double-argument operators, selection and call operators, indexing operator, arithmetic and logical operators, operator priorities. Bitwise operators.
5	5. Functions: arguments, declaration, definition, call, use of functions.
6	6. Arrays: declaration, basic operations, character arrays, two-dimensional arrays, use of arrays.
7	7. Pointers: defining constant pointers, pointers to constants, pointers to variables of a specific type. Rules for working with pointers. Using pointers to pass arguments to functions.
8	8. Dynamic memory allocation and deallocation. malloc(), calloc(), free() functions. Dynamic allocation of arrays, array vs pointer. Heap.
9	9. Structures: defining structures, defining pointers to structures, structure arrays, using structures in the implementation of complex data structures: lists, trees, etc.

10	10. File input/output operations. Text and binary files. Working with files: associating streams with files, modes of opening, writing, reading, and closing files.
Laboratory	
1	Presentation of the topics, plan, and scope of the laboratory. Discussion of the conditions for passing. Discussion of the programming environment.
2	First program in C. Printf and scanf functions. Defining types, variables, assignment statement.
3	Conditional statement, if-else conditional statement, switch statement, loop statements: for, while.
4	Expressions, arithmetic operators, logical operators, operator precedence. Bitwise operations.
5	Function declaration and definition, passing arguments to functions, function calls and applications.
6	Definition of one- and two-dimensional arrays, implementation of functions that support arrays, examples of array applications, implementation of a selected array sorting algorithm.
7	Defining pointers: to variables, to constants, defining constant pointers and void pointers. Passing arguments to functions using pointers, using pointers to handle arrays.
8	Memory allocation and deallocation functions: malloc(), calloc(), free(). Dynamic array allocation.
9	Defining structures, defining pointers to structures, the > operator, structure arrays, implementation of a stack and an ordered single- and double-linked list.
10	Implementation of a binary search tree, implementation of recursive tree balancing methods.
11	Defining file input/output operations. Implementation of functions associating streams with files. Implementation of file open, write, read, and close operations.
12	Make-up tests. Summary and completion of laboratory classes.
Project	
1	1. Defining the project task. Specification of the goal, assumptions, functional and non-functional requirements.
2	2. Defining the application structure. Defining (writing down) use cases.
3	3. Implementation of the designed solution.
4	4. Testing and corrections, and preparation of the final version of the project.
5	5. Preparation of project documentation. Project completion.

TEACHING METHODS

Problem-based lecture, conventional lecture, case method, discussion, demonstration, laboratory exercises, project classes, work in a virtual environment

ASSESSMENT CRITERIA

The final grade for the course is the arithmetic mean of all forms of classes.

Each form of class must be assessed positively.

Detailed information will be provided during the first class when the syllabus is presented.

VERIFICATION OF LEARNING OUTCOMES

CODE		DESCRIPTION	LEARNING OUTCOME
		Knowledge **Lecture**	
W1	1	written exam	**INF1st_W4**
		Skills **Lecture**	
U1	1	written exam	**INF1st_U6 INF1st_U11**
U2	1	written exam	**INF1st_U6 INF1st_U11**
		Knowledge **Laboratory**	
		Skills **Laboratory**	
U1	1	Project	**INF1st_U6 INF1st_U11**
	2	report(s)	
U2	1	Project	**INF1st_U6 INF1st_U11**
	2	report(s)	
		Knowledge **Project**	
W1	1	Project	**INF1st_W3**
W2	1	Multimedia presentation	**INF1st_W3**
		Skills **Project**	
U1	1	oral response	**INF1st_U9 INF1st_U10**
U2	1	report(s)	**INF1st_U10**

ASSESSMENT FORMS		
Assessment criteria according to the scale:		
very good	**5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a very gooddegree
good plus	**4,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a more than good degree
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unsatisfactory	**3**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice
pass	**pass**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice
failed	**nzal**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice

LITERATURE

Basic

1	Stephen Prata, C. Programming School, 6th Edition, Helion 2016.
2	Stephen G. Kochan, The C Language: A Compendium of Knowledge, 4th edition, Helion 2015.
3	Anna Łupińska-Dubicka, Marek Tabędzki, Basics of Programming in C. Exercises with Solutions, Białystok University of Technology Publishing House 2023.
4	Brian W. Kernighan, Dennis M. Ritchie, C Programming Language (2nd Edition), Helion 2020.

STATE UNIVERSITY OF APPLIED SCIENCES IN GŁOGÓW

INSTITUTE OF ENGINEERING AND TECHNICAL SCIENCES

SYLLABUS / COURSE DESCRIPTION

BASIC INFORMATION ABOUT THE SUBJECT			
Name of the subject (module)	**Programming Strategies II**	Course code	**21**
Name of the unit teaching the subject	**Institute of Engineering and Technology**		
Level of education	**First-cycle studies**	Profile	**Practical**
Field of study	**Computer Science**	Specialization	
Education module	**Field-specific**	Language of instruction	**English**
Semester	**II**	Form of assessment	**Exam**

HOURLY DIMENSION OF DIDACTIC CLASSES		
FULL-TIME STUDIES		
Lecture	Project	Laboratory
15	30	30

TOTAL HOURLY DIMENSION OF CLASSES	
Student's independent work	75
Total	**150**
ECTS	**6**

PREREQUISITES

Programming strategies I

COURSE OBJECTIVE

The aim of the course is to present the idea of object-oriented programming, describe tools supporting the creation of abstract data types, tools (methods) supporting object-oriented programming (inheritance, polymorphism, virtual functions, abstract classes), describe tools (methods) supporting generalized programming (function templates, class templates).

LEARNING OUTCOMES FOR THE COURSE

CODE	DESCRIPTION	LEARNING OUTCOME
	Knowledge	
W1	The student is able to explain the difference between object-oriented and structured programming.	**INF1st_W4**
W2	Knows and can describe selected design patterns and can indicate their importance in program design.	**INF1st_W4**
	Skills	
U1	Can describe the properties of classes and objects and implement basic class components.	**INF1st_U11**
U2	Is able to design and implement composition, aggregation, and class hierarchy (polymorphism).	**INF1st_U11**

EDUCATIONAL CONTENT

TOPIC	
	Lecture
1	1. Introduction to object-oriented programming. The paradigm of object-oriented programming and object-oriented programming.
2	2. Pointers in C++: pointers to constants, constant pointers. Properties and applications of the unique_ptr pointer. Properties and definition of references and references to constants. The importance of pointers and references in passing parameters to functions.
3	3. Encapsulation of class members, class member functions. Private and public class members. Creation and properties of class objects.

4	4. Definition and properties of a class constructor, constructor initialization list, initialization order of class object members. Default constructor. Friend functions. Function overloading: operator overloading, impact of default arguments on function overloading.
5	5. User-defined conversions: conversion function, conversion constructor.
6	6. Dynamic allocation of class objects. Copy constructor, assignment operator function, destructor.
7	7. Class inheritance, derived class constructors, reserved class components (protected class components).
8	8. Polymorphism, virtual functions, virtual destructors, pure virtual functions, abstract class.
9	9. Presentation of the mechanism of composition, aggregation, and generalization, examples of applications.
10	10. Iterators, containers (vectors, lists, maps), lambda expressions.
11	11. Handling exceptions, block definitions, nested blocks.
12	12. Generalized programming: function templates, class templates, definition of template functions
Laboratory	
1	1. Presentation of the subject matter, plan, and scope of the laboratory. Discussion of the conditions for passing. Discussion of the programming environment.
2	2. Defining pointers in C++, the unique_ptr pointer. Defining references and references to constants. Examples of using pointers and references in passing parameters to functions.
3	3. Defining classes, class members, class member functions, creating class objects. Calling class member methods. Implementing simple classes.
4	4. Defining class constructors, constructor initialization list. Friend functions vs. class member functions. Function overloading. Overloading arithmetic and logical operators.
5	5. New and delete statements for allocating and destroying class objects, definition and meaning of the copy constructor, destructor.
6	6. Overloading component operators (), [], =, ->. Defining a copy constructor and a move constructor. Overloading the new and delete operators.
7	7. Implementation of a conversion function and a conversion constructor. Analysis of the ambiguity of implicit calls to conversion functions.
8	8. Creating a hierarchical class structure (class inheritance), defining derived class constructors, defining derived class constructors using an initialization list
9	9. Examples of polymorphism applications, defining virtual functions, defining virtual destructors and pure virtual functions. Implementing a class hierarchy containing abstract class(es).
10	10. Examples of programs using composition and aggregation mechanisms.
11	11. Programming using mechanisms and methods from the STL library: iterators, containers. Examples of lambda expression applications.
12	12. Implementation of exceptions, definition of blocks, nested blocks.
13	13. Defining function templates and class templates, examples of applications
14	14. Summary, retake exams, and final grades for the lab
Project	
1	1. Defining the project task. Specification of the goal, assumptions, functional and non-functional requirements.
2	2. Defining the application structure. Defining (writing down) use cases.
3	3. Implementation of the designed solution
4	4. Testing and corrections, and preparation of the final version of the project
5	5. Preparation of project documentation. Project completion.

TEACHING METHODS

Problem-based lecture, conventional lecture, case method, discussion, demonstration, laboratory exercises, project classes, work in a virtual environment

ASSESSMENT CRITERIA

The final grade for the course is the arithmetic mean of all forms of classes.

Each form of class must be assessed positively.

Detailed information will be provided during the first class when the syllabus is presented.

VERIFICATION OF LEARNING OUTCOMES

CODE		DESCRIPTION	LEARNING OUTCOME
Knowledge		**Lecture**	
W1	1	written exam	**INF1st_W4**
W2	1	written exam	**INF1st_W4**
Skills		**Lecture**	
U1	1	written exam	**INF1st_U11**
U2	1	written exam	**INF1st_U11**

Knowledge		**Laboratory**	
W1	1	Project	**INF1st_W4**
	2	report(s)	
W2	1	Project	**INF1st_W4**
	2	report(s)	
Skills		**Laboratory**	
U1	1	Project	**INF1st_U11**
	2	report(s)	
U2	1	Project	**INF1st_U11**
	2	report(s)	
Knowledge		**Project**	
W1	1	Project	**INF1st_W4**
	2	Multimedia presentation	
W2	1	Project	**INF1st_W4**
	2	Multimedia presentation	
Skills		**Project**	
U1	1	Project	**INF1st_U11**
U2	1	Project	**INF1st_U11**

ASSESSMENT FORMS

Assessment criteria according to the scale:

very good	**5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a very gooddegree
good plus	**4,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a more than good degree
good	**4**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a good degree
sufficient plus	**3,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a fairly good degree
satisfactory	**3**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a satisfactory degree
unsatisfactory	**3**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice
pass	**pass**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice
failed	**nzal**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice

LITERATURE

Basic

1	Jerzy Grębosz, Opus magnum C++. Programming in C++, 3rd edition, Helion 2024.
2	Bjarne Stroustrup, The C++ Language. A Compendium of Knowledge. 4th edition, Helion 2014.
3	Aleksander Bies, Object-oriented programming for students and INF.04 programmer technicians, ITStart 2023.
4	Graham Lee, Modern Programming: Object Oriented Programming and Best Practices. Deconstruct object-oriented programming and use it with other programming paradigms to build applications, Packt Publishing 2019.

STATE UNIVERSITY OF APPLIED SCIENCES IN GŁOGÓW

INSTITUTE OF ENGINEERING AND TECHNICAL SCIENCES

SYLLABUS / COURSE DESCRIPTION

BASIC INFORMATION ABOUT THE SUBJECT			
Name of the subject (module)	**Computer Networks I**	Course code	**30**

Name of the unit teaching the subject	**Institute of Engineering and Technology**		
Level of education	**First-cycle studies**	Profile	**Practical**
Field of study	**Computer Science**	Specialization	
Education module	**Field-specific**	Language of instruction	**English**
Semester	**III**	Form of assessment	**Pass with a grade**

HOURLY DIMENSION OF DIDACTIC CLASSES		
FULL-TIME STUDIES		
Lecture	Project	Laboratory
15	30	30

TOTAL HOURLY DIMENSION OF CLASSES	
Student's independent work	75
Total	**150**
ECTS	**6**

COURSE OBJECTIVE

The aim of the course is to provide knowledge and develop skills in the field of computer networks: - LAN hardware and software infrastructure - LAN technologies - ISO/OSI and TCP/IP models - IPv4 addressing systems - routing protocols

LEARNING OUTCOMES FOR THE COURSE

CODE	DESCRIPTION	LEARNING OUTCOME
	Knowledge	
W1	Able to diagnose the hardware and software infrastructure of a LAN.	**INF1st_W7**
W2	Can characterize LAN technologies.	**INF1st_W7**
W3	Can characterize ISO/OSI and TCP/IP models.	**INF1st_W7**
W4	Knows and can describe IPv4 addressing systems.	**INF1st_W7**
W5	Can characterize routing protocols operating according to distance vector and link state.	**INF1st_W7**
W6	Can characterize and indicate the differences between static and dynamic routing.	**INF1st_W7**
	Skills	
U1	Can perform basic configuration of network devices.	**INF1st_U14**
U2	Can select, configure, and operate network devices, in particular switches and routers.	**INF1st_U14**
U3	Can creatively develop IPv4 address space allocation.	**INF1st_U14**
U4	Uses tools for creating and testing Ethernet network cabling.	**INF1st_U14**
U5	Can implement static and dynamic routing in LAN networks.	**INF1st_U14**
U6	Can creatively develop the division of IPv4 address space into subnets, design a physical/logical computer network topology diagram, and implement an addressing system.	**INF1st_U14**

U7	Is able to identify potential threats to computer network security and counteract them by using security techniques, e.g., standard ACL lists.	**INF1st_U14**

EDUCATIONAL CONTENT	
TOPIC	
Lecture	
1	Introduction to computer networks: network components, network representation and topologies, typical types of networks.
2	Basics of switch and end device configuration, operating systems of network devices, and configuration methods.
3	Basics of router configuration. Router structure, configuration, network layer diagnostics.
4	Protocols and models: ISO/OSI and TCP/IP reference models, the importance of network protocols.
5	Physical layer: purpose and function of the physical layer, types of media: twisted pair, fiber optic, and wireless.
6	Ethernet and its variants.
7	IPv4 and IPv6 protocols. Types of IP addresses and their limitations.
8	Addressing, division of networks into subnets.
9	Logical addressing protocols for hosts and network devices: DHCPv4, SLAAC, DHCPv6.
10	Routing basics. Static routing. Static and default routes.
11	Dynamic routing in LANs (RIPv2, OSPF). Redistribution of static routing within dynamic routing.
12	Standard and extended ACL lists.
Laboratory	
1	Basics of switch and end device configuration.
2	Basics of router configuration.
3	Addressing, division of networks into subnets.
4	Logical addressing protocols for hosts and network devices: DHCPv4.
5	Logical addressing protocols for hosts and network devices: SLAAC, DHCPv6.
6	Routing basics. Static routing. Static and default routes.
7	Dynamic routing in LANs (RIPv2, OSPF). Redistribution of static routing within dynamic routing.
8	Standard and extended ACL lists.
Project	
1	1. Defining the project task. Specification of the goal, assumptions, functional and non-functional requirements.
2	2. Defining the application structure. Defining (writing down) use cases.
3	3. Implementation of the designed solution
4	4. Testing and corrections, and preparation of the final version of the project
5	5. Preparation of project documentation. Project completion.

TEACHING METHODS
Problem-based lecture, conventional lecture, case method, discussion, demonstration, laboratory exercises, project classes, work in a virtual environment

ASSESSMENT CRITERIA
The final grade for the course is the arithmetic mean of all forms of classes.
Each form of class must be assessed positively.
Detailed information will be provided during the first class when the syllabus is presented.

VERIFICATION OF LEARNING OUTCOMES			
CODE	**DESCRIPTION**		**LEARNING OUTCOME**
Knowledge	**Lecture**		
W1	1	final test	**INF1st_W7**
W2	1	final test	**INF1st_W7**
W3	1	final test	**INF1st_W7**
W4	1	final test	**INF1st_W7**
W5	1	final test	**INF1st_W7**
W6	1	final test	**INF1st_W7**
Skills	**Lecture**		
U1	1	final test	**INF1st_U14**
U2	1	final test	**INF1st_U14**
U3	1	final test	**INF1st_U14**
U4	1	final test	**INF1st_U14**

U5	1	final test	**INF1st_U14**
U6	1	final test	**INF1st_U14**
U7	1	final test	**INF1st_U14**
		Knowledge **Laboratory**	
W1	1	Project	**INF1st_W7**
	2	report(s)	
	3	Multimedia presentation	
W2	1	Project	**INF1st_W7**
	2	report(s)	
	3	Multimedia presentation	
W3	1	Project	**INF1st_W7**
	2	report(s)	
	3	Multimedia presentation	
W4	1	Project	**INF1st_W7**
	2	report(s)	
	3	Multimedia presentation	
W5	1	Project	**INF1st_W7**
	2	report(s)	
	3	Multimedia presentation	
W6	1	Project	**INF1st_W7**
	2	report(s)	
	3	Multimedia presentation	
		Skills **Laboratory**	
U1	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
U2	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
U3	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
U4	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
U5	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
U6	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
U7	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
		Knowledge **Project**	
W1	1	Project	**INF1st_W3**
W2	1	Multimedia presentation	**INF1st_W3**
		Skills **Project**	
U1	1	oral response	**INF1st_U9 INF1st_U10**
U2	1	report(s)	**INF1st_U10**

ASSESSMENT FORMS		
Assessment criteria according to the scale:		
very good	**5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a very gooddegree
good plus	**4,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a more than good degree
good	**4**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a good degree
sufficient plus	**3,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a fairly good degree
satisfactory	**3**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a satisfactory degree
unsatisfactory	**3**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice
pass	**pass**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice
failed	**nzal**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice

LITERATURE

Basic

1	Training materials: CISCO CCNA, available through the CISCO NETWORKING ACADEMY portal
2	Adam Józefiok: On the way to CCNA. Part I, Helion, Gliwice, 2021
3	Adam Józefiok: On the way to CCNA. Part II, Helion, Gliwice, 2021
4	Glen D. Singh, Implementing and Administering Cisco Solutions: 200-301 CCNA Exam Guide. Begin a successful career in networking with CCNA 200-301 certification, Packt Publishing, 2020
5	Ben Piper, Cisco Networks in a Month. Administrator's Handbook, Helion, Gliwice, 2018.

STATE UNIVERSITY OF APPLIED SCIENCES IN GŁOGÓW

INSTITUTE OF ENGINEERING AND TECHNICAL SCIENCES

SYLLABUS / COURSE DESCRIPTION

BASIC INFORMATION ABOUT THE SUBJECT			
Name of the subject (module)	**Applications of computer graphics**	Course code	**34**

Name of the unit teaching the subject	**Institute of Engineering and Technology**		
Level of education	**First-cycle studies**	Profile	**Practical**
Field of study	**Computer Science**	Specialization	
Education module	**Field-specific**	Language of instruction	**English**
Semester	**IV**	Form of assessment	**Pass with a grade**

HOURLY DIMENSION OF DIDACTIC CLASSES		
FULL-TIME STUDIES		
Lecture	Project	Laboratory
0	45	30

TOTAL HOURLY DIMENSION OF CLASSES	
Student's independent work	75
Total	**150**
ECTS	**6**

PREREQUISITES

Fundamentals of computer graphics

COURSE OBJECTIVE

The aim of the course is to develop key skills enabling students to: use programs that process raster, vector, and 3D graphics; plan and execute a graphic design project using modern graphic tools; and prepare materials for screen, print, and 3D printing projects.

LEARNING OUTCOMES FOR THE COURSE

CODE	DESCRIPTION	LEARNING OUTCOME
	Skills	
U1	The student is able to use programs that process raster, vector, and 3D graphics	**INF1st_U13**
U2	They are able to independently plan and execute a graphic design project using modern graphic tools.	**INF1st_U13**
U3	They are able to prepare materials for screen, print, and 3D printing projects.	**INF1st_U13**
U4	They can solve practical problems related to the creation of graphic designs.	**INF1st_U13**

EDUCATIONAL CONTENT

	TOPIC
	Laboratory
1	Introduction. Presentation of expected learning outcomes and literature. Selection in raster images.
2	Layers and layer masks
3	Tonal correction. Retouching
4	Raster image filters
5	Introduction to vector graphics. Basic operations in vector graphics.
6	File export and color separation.
7	3D modeling
8	Materials in 3D graphics
9	Computer animation in a 3D environment. Rendering 3D graphics

Project	
1	Introduction. Division into project groups. Development of tasks to be carried out as part of the project. Distribution of responsibilities within project groups. Reminder of the need to respect copyright.
2	Consultations on the progress of project work.
3	Checking the progress of project work.
4	Consultations on the progress of project work.
5	Evaluation of the final version of the completed project.

TEACHING METHODS

Problem-based lecture, conventional lecture, case method, discussion, demonstration, laboratory exercises, project classes, work in a virtual environment

ASSESSMENT CRITERIA

The final grade for the course is the arithmetic mean of all forms of classes.

Each form of class must be assessed positively.

Detailed information will be provided during the first class when the syllabus is presented.

VERIFICATION OF LEARNING OUTCOMES

CODE		DESCRIPTION	LEARNING OUTCOME
Skills		**Laboratory**	
U1	1	Project	**INF1st_U13**
	2	report(s)	
	3	Multimedia presentation	
U2	1	Project	**INF1st_U13**
	2	report(s)	
	3	Multimedia presentation	
U3	1	Project	**INF1st_U13**
	2	report(s)	
	3	Multimedia presentation	
U4	1	Project	**INF1st_U13**
	2	report(s)	
	3	Multimedia presentation	
Knowledge		**Project**	
W1	1	Project	**INF1st_W3**
W2	1	Multimedia presentation	**INF1st_W3**
Skills		**Project**	
U1	1	oral response	**INF1st_U9 INF1st_U10**
U2	1	report(s)	**INF1st_U10**

ASSESSMENT FORMS

Assessment criteria according to the scale:

very good	**5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a very gooddegree
good plus	**4,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a more than good degree
good	**4**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a good degree
sufficient plus	**3,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a fairly good degree
satisfactory	**3**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a satisfactory degree
unsatisfactory	**3**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice
pass	**pass**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice
failed	**nzal**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice

LITERATURE

Basic

1. Faulkner A., Chavez C. Adobe Photoshop PL 2020 edition: official manual. Helion 2021.
2. Wood. B. Adobe Illustrator PL 2020 edition. Official manual. Helion 2021.
3. Fiell Ch., Fiell P. Graphic Design in the 21st Century. Cologne 2005.

4	Bociek B. Blender. Modeling Basics. Helion 2007
5	Renderfield M. Mastering Blender 4.2: Comprehensive Step-by-Step Guide to Create Stunning 3D Arts, Animations & Transforming Your Imagination into Reality. 2024.
6	Brito A. Blender 4.0: Precise Modeling for Architecture, Engineering, and 3D Printing. Published by Allan Brito 2024.

Summer semester

STATE UNIVERSITY OF APPLIED SCIENCES IN GŁOGÓW

INSTITUTE OF ENGINEERING AND TECHNICAL SCIENCES

SYLLABUS / COURSE DESCRIPTION

BASIC INFORMATION ABOUT THE SUBJECT			
Name of the subject (module)	**Fundamentals of Computer Science II**	Course code	**18**

Name of the unit teaching the subject	**Institute of Engineering and Technology**		
Level of education	**First-cycle studies**	Profile	**Practical**
Field of study	**Computer Science**	Specialization	
Education module	**Field-specific**	Language of instruction	**English**
Semester	**II**	Form of assessment	**Pass with a grade**

HOURLY DIMENSION OF DIDACTIC CLASSES		
FULL-TIME STUDIES		
Lecture	Project	Laboratory
15	30	30

TOTAL HOURLY DIMENSION OF CLASSES	
Student's independent work	75
Total	**150**
ECTS	**6**

PREREQUISITES
Fundamentals of Computer Science I

COURSE OBJECTIVE
The aim of the course is to present the theory of automata and formal languages, computational complexity, and the classification of problems according to their computational complexity. Analysis of methods for dealing with computationally difficult problems. Presentation of the basics of software modeling, in particular software modeling using the UML language.

LEARNING OUTCOMES FOR THE COURSE		
CODE	**DESCRIPTION**	**LEARNING OUTCOME**
Knowledge		
W1	Is able to discuss key aspects of automata and grammars. Is able to solve selected problems using the formalism of automata and grammars.	**INF1st_W3**
W2	Has knowledge of computational complexity and estimation of the computational complexity of sequential algorithms.	**INF1st_W3**
Skills		
U1	Is able to solve problems taking into account available techniques and resources.	**INF1st_U10**
U2	Is able to analyze the correctness of an algorithm and estimate its computational complexity.	**INF1st_U10 INF1st_U11**
U3	Is able to describe the basics of program modeling based on basic UML diagrams.	**INF1st_U11**

EDUCATIONAL CONTENT	
TOPIC	
Lecture	
1	1. Computational complexity: memory, time.
2	2. Problem complexity limitations; algorithmic gap. Determining computational complexity - complexity orders.
3	3. Recursion - universal recursion theorem.
4	4. Words, languages, operations on languages. Deterministic and non-deterministic finite automata. Equivalence of finite automata, languages, and regular expressions.
5	5. Regular expressions in programming practice.
6	6. Grammars and context-free languages. Grammars in Chomsky normal form. Parsing.
7	7. Stack automata. Deterministic and non-deterministic Turing machines.
8	8. Polynomial reductions. NP-complete problems. Cook's theorem.
9	9. Designing algorithms for computationally difficult problems.
10	10. Introduction to software modeling. Modeling in software design.
11	11. UML language: characteristics of UML diagrams, class and object diagrams, use case diagrams, defining (writing down) use cases, action diagrams.
12	12. Modeling an information system using the UML language. Modeling selected aspects of software (e.g., system requirements, solution architecture, functionalities of the designed system, implementation scheme) using selected UML diagrams.
Laboratory	
1	1. Presentation of the topics, schedule, and rules for passing the laboratory.
2	2. Words, languages, regular expressions, and deterministic automata.
3	3. Deterministic finite automata. Nondeterministic finite automata. Determinism and minimization.
4	4. Design and implementation of parsers.
5	5. Regular expressions in programming practice.
6	6. Design and implementation of algorithms for computationally difficult problems.
7	7. Moore and Mealy automata. Encoding input and output signals, encoding states, encoding transition tables.
8	8. Software modeling and rules for writing use cases.
9	9. Drawing and analyzing use case diagrams
10	10. Test correction. Summary and completion of exercises.
Project	
1	1. Defining the project task. Specification of the goal, assumptions, functional and non-functional requirements.
2	2. Defining the application structure. Defining (writing down) use cases.
3	3. Implementation of the designed solution
4	4. Testing and corrections, and preparation of the final version of the project
5	5. Preparation of project documentation. Project completion.

TEACHING METHODS
Problem-based lecture, conventional lecture, case method, demonstration, laboratory exercises

ASSESSMENT CRITERIA
The final grade for the course is the arithmetic mean of all forms of classes.
Each form of class must be assessed positively.
Detailed information will be provided during the first class when the syllabus is presented.

VERIFICATION OF LEARNING OUTCOMES			
CODE	**DESCRIPTION**		**LEARNING OUTCOME**
Knowledge	**Lecture**		
W1	1	final test	**INF1st_W3**
W2	1	final test	**INF1st_W3**
Skills	**Lecture**		
U1	1	Project	**INF1st_U10**
	2	report(s)	
U2	1	Project	**INF1st_U10 INF1st_U11**
	2	report(s)	
U3	1	report(s)	**INF1st_U11**
Knowledge	**Laboratory**		
W1	1	Project	**INF1st_W3**
	2	report(s)	

W2	1	Project	**INF1st_W3**
	2	report(s)	
Skills		**Laboratory**	
U1	1	report(s)	**INF1st_U10**
U2	1	Project	**INF1st_U10 INF1st_U11**
	2	report(s)	
U3	1	Project	**INF1st_U11**
	2	report(s)	
Knowledge		**Project**	
W1	1	Project	**INF1st_W3**
W2	1	Multimedia presentation	**INF1st_W3**
Skills		**Project**	
U1	1	oral response	**INF1st_U9 INF1st_U10**
U2	1	report(s)	**INF1st_U10**

ASSESSMENT FORMS

Assessment criteria according to the scale:

very good	**5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a very gooddegree
good plus	**4,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a more than good degree
good	**4**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a good degree
sufficient plus	**3,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a fairly good degree
satisfactory	**3**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a satisfactory degree
unsatisfactory	**3**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice
pass	**pass**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice
failed	**nzal**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice

LITERATURE

Basic

1	Feliks Kurp, Algorithms. Data Structures and Computational Complexity, Helion 2022.
2	Robert Sedgewick, Kevin Wayne, Algorithms. 4th edition, Helion 2012.
3	Michał Śmiałek, Kamil Rybiński, Software Engineering in Practice. From Requirements to Code with UML, Helion 2023
4	Philippe Baumann, Patrick Grassle, Henriette Baumann, UML 2.0 in Action: A project-based tutorial. A detailed and practical book and eBook walk-through showing how to apply UML to real world development projects, Packt Publishing 2015.

STATE UNIVERSITY OF APPLIED SCIENCES IN GŁOGÓW

INSTITUTE OF ENGINEERING AND TECHNICAL SCIENCES

SYLLABUS / COURSE DESCRIPTION

BASIC INFORMATION ABOUT THE SUBJECT			
Name of the subject (module)	**Programming Strategies III**	Course code	**22**
Name of the unit teaching the subject	**Institute of Engineering and Technology**		
Level of education	**First-cycle studies**	Profile	**Practical**
Field of study	**Computer Science**	Specialization	
Education module	**Field-specific**	Language of instruction	**English**
Semester	**III**	Form of assessment	**Exam**

HOURLY DIMENSION OF DIDACTIC CLASSES		
FULL-TIME STUDIES		
Lecture	Project	Laboratory
15	30	30

TOTAL HOURLY DIMENSION OF CLASSES	
Student's independent work	75
Total	**150**
ECTS	**6**

PREREQUISITES

Programming Strategies II

COURSE OBJECTIVE

The aim of the course is to present the properties of scripting languages and the differences between compiled and scripting languages. Presentation of basic instructions in Python and advanced methods and tools available in the standard library and other libraries (Numpy, Scipy) of Python.

LEARNING OUTCOMES FOR THE COURSE

CODE	DESCRIPTION	LEARNING OUTCOME
	Knowledge	
W1	Knows the syntax and data structures of Python and the purpose of selected libraries.	**INF1st_W4**
W2	Can describe the differences between interpreted and compiled languages.	**INF1st_W4**
W3	Can discuss the properties of selected synchronization mechanisms and apply them to solve concurrent problems.	**INF1st_W4**
	Skills	
U1	Can apply object-oriented programming mechanisms in Python.	**INF1st_U6 INF1st_U11**
U2	Can design and implement solutions to concurrent programming problems.	**INF1st_U6 INF1st_U11**
U3	Can design and implement programs in a distributed environment.	**INF1st_U6 INF1st_U11**
U4	Can independently program in Python, creating programs consisting of several functions, using objects of different classes, and editing files.	**INF1st_U11**
U5	Can use virtual environments and package management tools, and can use selected libraries for data presentation and calculations.	**INF1st_U11**
U6	Can identify applications for concurrent programming and justify the need for its use.	**INF1st_U11**

U7	Can implement complex concurrent programming problems based on appropriate synchronization mechanisms.	INF1st_U11

EDUCATIONAL CONTENT	
TOPIC	
Lecture	
1	1. Compilation vs. interpretation, system languages vs. scripting languages. Introduction to Python, Python interpreter, basic language syntax.
2	2. Defining functions and objects. References, namespaces.
3	3. Modules and packages, exception handling, assertions.
4	4. Object-oriented programming in Python.
5	5. Python development environment. Package management and module search path.
6	6. Built-in tools – Python standard library.
7	7. File and directory manipulation, data loading. Simple network communication. Internet operations. Numpy and Scipy libraries.
8	8. Advanced topics: decorators, attribute management, generators, regular expressions
Laboratory	
1	1. Presentation of the topics, plan, and scope of the lab. Discussion of the conditions for passing.
2	2. Discussion of the programming environment. IDLE user interface, code execution options.
3	3. Writing programs using basic data types: lists, dictionaries, tuples.
4	4. Introduction to basic Python statements: assignment, expressions, in-place modifications, conditional statements.
5	5. Use of binary and text files, numeric types in Python.
6	6. Defining dynamic types: objects, references, shared references.
7	7. Strings, lists, and dictionaries in Python
8	8. Loops in Python: while loops, for loops, nested lists.
9	9. Iterations in Python, iterable types.
10	10. Defining functions (def statement), function calls, local variables.
11	11. Arguments in functions, rules for matching function arguments, recursive functions.
12	12. Function objects, basics of Lambda expressions, functional programming.
13	13. Implementation of tuples and generator expressions.
14	14. Modules and packages, Python program architecture, creating modules, creating module packages.
15	15. Defining classes, searching for attributes, defining and calling class member methods. Constructors and destructors in class definitions.
16	16. Advanced programming using object-oriented programming: inheritance, namespaces, nested classes.
17	17. Operator overloading: indexing, slicing, iterator objects, string representations, __call__ calls, comparisons.
18	18. Class hierarchy, polymorphism, composition, wrapper objects.
19	19. Implementation of built-in type extension, static methods vs. class methods.
20	20. Exceptions: basic statements (try, except, finally, raise, assert), exception objects.
21	21. Function and class decorators. Metaclasses: metaclass model, declaration and creation of metaclasses, defining metaclass methods.
22	22. Summary, retake exams, and final grades for the lab
Project	
1	1. Introduction to the project - presentation of the project task in the field of object-oriented programming in Python using tools from the standard library and other available libraries such as Numpy and Scipy.
2	2. Division into project groups, distribution of responsibilities among students in a given project group.
3	3. Development of tasks to be carried out in accordance with the project task undertaken.
4	4. Consultations on progress, ongoing validation and verification of completed parts of the project (tests).
5	5. Evaluation of the final version of the completed project.

TEACHING METHODS
Problem-based lecture, conventional lecture, case method, discussion, demonstration, laboratory exercises, project classes, work in a virtual environment

ASSESSMENT CRITERIA
The final grade for the course is the arithmetic mean of all forms of classes.
Each form of class must be assessed positively.
Detailed information will be provided during the first class when the syllabus is presented.

VERIFICATION OF LEARNING OUTCOMES		
CODE	**DESCRIPTION**	**LEARNING OUTCOME**

Knowledge		**Lecture**	
W1	1	written exam	**INF1st_W4**
W2	1	written exam	**INF1st_W4**
W3	1	written exam	**INF1st_W4**
Skills		**Lecture**	
U1	1	written exam	**INF1st_U6 INF1st_U11**
U2	1	written exam	**INF1st_U6 INF1st_U11**
U3	1	written exam	**INF1st_U6 INF1st_U11**
U4	1	written exam	**INF1st_U11**
U5	1	written exam	**INF1st_U11**
U6	1	written exam	**INF1st_U11**
U7	1	written exam	**INF1st_U11**
Knowledge		**Laboratory**	
W1	1	Project	**INF1st_W4**
	2	report(s)	
	3	Multimedia presentation	
W2	1	Project	**INF1st_W4**
	2	report(s)	
	3	Multimedia presentation	
W3	1	Project	**INF1st_W4**
	2	report(s)	
	3	Multimedia presentation	
Skills		**Laboratory**	
U1	1	Project	**INF1st_U6 INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	
U2	1	Project	**INF1st_U6 INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	
U3	1	Project	**INF1st_U6 INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	
U4	1	Project	**INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	
U5	1	Project	**INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	
U6	1	Project	**INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	
Knowledge		**Project**	
W1	1	Project	**INF1st_W4**
	2	Multimedia presentation	
W2	1	Project	**INF1st_W4**
	2	Multimedia presentation	
W3	1	Project	**INF1st_W4**
	2	Multimedia presentation	
Skills		**Project**	
U1	1	Project	**INF1st_U6 INF1st_U11**

	2	Multimedia presentation	
U2	1	Project	**INF1st_U6 INF1st_U11**
	2	Multimedia presentation	
U3	1	Project	**INF1st_U6 INF1st_U11**
	2	Multimedia presentation	
U4	1	Project	**INF1st_U11**
	2	Multimedia presentation	
U5	1	Project	**INF1st_U11**
	2	Multimedia presentation	
U6	1	Project	**INF1st_U11**
	2	Multimedia presentation	
U7	1	Project	**INF1st_U11**
	2	Multimedia presentation	

ASSESSMENT FORMS

Assessment criteria according to the scale:

very good	**5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a very gooddegree
good plus	**4,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a more than good degree
good	**4**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a good degree
sufficient plus	**3,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a fairly good degree
satisfactory	**3**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a satisfactory degree
unsatisfactory	**3**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice
pass	**pass**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice
failed	**nzal**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice

LITERATURE

Basic

1	Mark Lutz, Python. Introduction. 5th edition, Helion 2022.
2	Wes McKinney, Python in Data Analysis. Data processing using pandas and NumPy packages and the Jupyter environment. 3rd edition, Helion 2023.
3	Gniewomir Sarbicki, Python. A Course for Teachers and Students, 2nd Edition, Helion 2022
4	Chetan Giridhar, Gennadiy Zlobin, Anand Balachandran Pillai, Learning Python Design Patterns, Second Edition, Packt Publishing 2016.

STATE UNIVERSITY OF APPLIED SCIENCES IN GŁOGÓW

INSTITUTE OF ENGINEERING AND TECHNICAL SCIENCES

SYLLABUS / COURSE DESCRIPTION

BASIC INFORMATION ABOUT THE SUBJECT			
Name of the subject (module)	**Programming Strategies IV**	Course code	**23**

Name of the unit teaching the subject	**Institute of Engineering and Technology**		
Level of education	**First-cycle studies**	Profile	**Practical**
Field of study	**Computer Science**	Specialization	
Education module	**Field-specific**	Language of instruction	**English**
Semester	**IV**	Form of assessment	**Exam**

HOURLY DIMENSION OF DIDACTIC CLASSES		
FULL-TIME STUDIES		
Lecture	Project	Laboratory
15	30	30

TOTAL HOURLY DIMENSION OF CLASSES	
Student's independent work	75
Total	**150**
ECTS	**6**

PREREQUISITES

Programming Strategies III

COURSE OBJECTIVE

The aim of the course is to provide key knowledge and skills enabling programming in JAVA of independent applications, applets run from web browsers, and network programs based on client-server architecture.

LEARNING OUTCOMES FOR THE COURSE

CODE	DESCRIPTION	LEARNING OUTCOME
	Knowledge	
W1	Able to analyze API documentation	**INF1st_W1**
W2	Knows the syntax and can characterize the rules for writing programs in Java	**INF1st_W1**
	Skills	
U1	Is able to create API documentation for the program created	**INF1st_U1**
U2	Can design and program standalone applications, applets run from web browsers, and network programs based on client-server architecture in Java.	**INF1st_U1**

EDUCATIONAL CONTENT

	TOPIC
	Lecture
1	1. Elements of the Java Standard Edition Platform. Java memory model and runtime environment
2	2. Language syntax and naming conventions, generating documentation from source code
3	3. Imperative programming in Java and variable types
4	4. Object-oriented programming in Java (inheritance, polymorphism, encapsulation)
5	5. Expressions and statements
6	6. Exception handling
7	7. Input and output operations, stream libraries
8	8. Concurrency
9	9. User interface in Java
10	10. Functional programming and Java Stream processing
11	11. Network application programming (sockets, client-server architecture, TCP and UDP protocols)

12	12. Database connections via JDBC, ORM libraries
Laboratory	
1	1. Elements of the Java Standard Edition Platform. Java memory model and runtime environment
2	2. Language syntax and naming conventions, generating documentation from source code
3	3. Imperative programming in Java and variable types
4	4. Object-oriented programming in Java (inheritance, polymorphism, encapsulation)
5	5. Expressions and statements
6	6. Exception handling
7	7. Input and output operations, stream libraries
8	8. Concurrency
9	9. User interface in Java
10	10. Functional programming and Java Stream processing
11	11. Network application programming (sockets, client-server architecture, TCP and UDP protocols)
12	12. Database connections via JDBC, ORM libraries
Project	
1	1. Defining the project task. Specification of the goal, assumptions, functional and non-functional requirements.
2	2. Defining the application structure. Defining (writing down) use cases.
3	3. Implementation of the designed solution
4	4. Testing and corrections, and preparation of the final version of the project
5	5. Preparation of project documentation. Project completion.

TEACHING METHODS

Problem-based lecture, conventional lecture, case method, discussion, demonstration, laboratory exercises, project classes, work in a virtual environment

ASSESSMENT CRITERIA

The final grade for the course is the arithmetic mean of all forms of classes.

Each form of class must be assessed positively.

Detailed information will be provided during the first class when the syllabus is presented.

VERIFICATION OF LEARNING OUTCOMES

CODE		DESCRIPTION	LEARNING OUTCOME
Knowledge		**Lecture**	
W1	1	written exam	**INF1st_W1**
W2	1	written exam	**INF1st_W1**
Skills		**Lecture**	
U1	1	written exam	**INF1st_U1**
U2	1	written exam	**INF1st_U1**
Knowledge		**Laboratory**	
W1	1	Project	**INF1st_W1**
	2	report(s)	
	3	Multimedia presentation	
W2	1	Project	**INF1st_W1**
	2	report(s)	
	3	Multimedia presentation	
Skills		**Laboratory**	
U1	1	Project	**INF1st_U1**
	2	report(s)	
	3	Multimedia presentation	
U2	1	Project	**INF1st_U1**
	2	report(s)	
	3	Multimedia presentation	
Knowledge		**Project**	
W1	1	Project	**INF1st_W3**
W2	1	Multimedia presentation	**INF1st_W3**

Skills		Project	
U1	1	oral response	INF1st_U9 INF1st_U10
U2	1	report(s)	**INF1st_U10**

ASSESSMENT FORMS

Assessment criteria according to the scale:

very good	**5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a very gooddegree
good plus	**4,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a more than good degree
good	**4**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a good degree
sufficient plus	**3,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a fairly good degree
satisfactory	**3**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a satisfactory degree
unsatisfactory	**3**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice
pass	**pass**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice
failed	**nzal**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice

LITERATURE

Basic

1	Bruce Eckel, Thinking in Java. English edition. 4th edition, Helion, 2006
2	Steven Chin, Johan Vos, et.al., The Definitive Guide to Modern Java Clients with JavaFX 17: Cross-Platform Mobile and Cloud Development, Apress, 2021,
3	Kathy Sierra, Bert Bates, Trisha Gee, Java. Use your head! 3rd edition, Helion, 2023
4	Ben Weidig, Java. Functional Approach. Extending Object-Oriented Java Code with Functional Programming Principles, Helion, 2024
5	Herbert Schild, Java: The Complete Reference, 12th edition, McGraw Hill, 2021.

STATE UNIVERSITY OF APPLIED SCIENCES IN GŁOGÓW

INSTITUTE OF ENGINEERING AND TECHNICAL SCIENCES

SYLLABUS / COURSE DESCRIPTION

BASIC INFORMATION ABOUT THE SUBJECT			
Name of the subject (module)	**Programming Strategies V**	Course code	**24**

Name of the unit teaching the subject	**Institute of Engineering and Technology**		
Level of education	**First-cycle studies**	Profile	**Practical**
Field of study	**Computer Science**	Specialization	
Education module	**Field-specific**	Language of instruction	**English**
Semester	**V**	Form of assessment	**Exam**

HOURLY DIMENSION OF DIDACTIC CLASSES		
FULL-TIME STUDIES		
Lecture	Project	Laboratory
15	30	30

TOTAL HOURLY DIMENSION OF CLASSES	
Student's independent work	75
Total	**150**
ECTS	**6**

PREREQUISITES

Programming Strategies IV

COURSE OBJECTIVE

The aim of the course is to provide key knowledge and skills enabling the design and implementation of mobile applications that support graphic and text objects, as well as hardware embedded in mobile devices.

LEARNING OUTCOMES FOR THE COURSE

CODE	DESCRIPTION	LEARNING OUTCOME
	Knowledge	
W1	The student will be able to describe emulation and code creation in a limited mobile environment.	**INF1st_W4**
	Skills	
U1	Can create a mobile application project for the Android system using the Maven repository.	**INF1st_U6 INF1st_U11**
U2	Has the ability to create mobile user interfaces, while separating the presentation layer from the application logic layer.	**INF1st_U6 INF1st_U11**
U3	Has the ability to design and implement a mobile database.	**INF1st_U6 INF1st_U11**
U4	Can prepare and configure a development environment for creating mobile applications.	**INF1st_U11**
U5	Can access individual components of a mobile device for programming purposes.	**INF1st_U11**
U6	Knows basic data exchange formats and can use them as the main data exchange format.	**INF1st_U11**
U7	Can communicate a mobile device with other devices and systems.	**INF1st_U11**

EDUCATIONAL CONTENT

TOPIC

Lecture

1	1. Introduction to mobile application programming. Installation and configuration of the environment, use of emulators. Maven repository
2	2. Design and implementation of graphical user interfaces (GUI), fragments
3	3. Handling graphics, animations, events (including asynchronous events), threads, and exceptions
4	4. Application data storage, database support
5	5. Network communication support, JSON and XML standards
6	6. Cryptography elements in mobile applications
7	7. Handling and accessing devices and sensors (camera, accelerometer, gyroscope, GPS, etc.)
8	8. Location programming, map support, positioning using networks
9	9. Methods of testing mobile applications
Laboratory	
1	1. Introduction to mobile application programming. Installation and configuration of the environment, use of emulators. Maven repository. Emulator configuration. First project, launch.
2	2. Design and implementation of graphical user interfaces (GUI), fragments
3	3. Handling graphics, animations, events (including asynchronous events), threads, and exceptions
4	4. Application data storage, database support
5	5. Network communication support, JSON and XML standards
6	6. Cryptography elements in mobile applications
7	7. Handling and accessing devices and sensors (camera, accelerometer, gyroscope, GPS, etc.)
8	8. Location programming, map support, positioning using networks
9	9. Methods of testing mobile applications
Project	
1	1. Defining the project task. Specification of the goal, assumptions, functional and non-functional requirements.
2	2. Defining the application structure. Defining (writing down) use cases.
3	3. Implementation of the designed solution
4	4. Testing and corrections, and preparation of the final version of the project
5	5. Preparation of project documentation. Project completion.

TEACHING METHODS

Problem-based lecture, conventional lecture, case method, discussion, demonstration, laboratory exercises, project classes, work in a virtual environment

ASSESSMENT CRITERIA

The final grade for the course is the arithmetic mean of all forms of classes.

Each form of class must be assessed positively.

Detailed information will be provided during the first class when the syllabus is presented.

VERIFICATION OF LEARNING OUTCOMES

CODE		DESCRIPTION	LEARNING OUTCOME
		Knowledge | **Lecture**	
W1	1	written exam	**INF1st_W4**
		Skills | **Lecture**	
U1	1	written exam	**INF1st_U6 INF1st_U11**
U2	1	written exam	**INF1st_U6 INF1st_U11**
U3	1	written exam	**INF1st_U6 INF1st_U11**
U4	1	written exam	**INF1st_U11**
U5	1	written exam	**INF1st_U11**
U6	1	written exam	**INF1st_U11**
U7	1	written exam	**INF1st_U11**
		Knowledge | **Laboratory**	
W1	1	Project	**INF1st_W4**
	2	report(s)	
	3	Multimedia presentation	
		Skills | **Laboratory**	
U1	1	Project	**INF1st_U6 INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	

U2	1	Project	**INF1st_U6 INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	
U3	1	Project	**INF1st_U6 INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	
U4	1	Project	**INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	
U5	1	Project	**INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	
U6	1	Project	**INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	
U7	1	Project	**INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	
Knowledge		**Project**	
W1	1	Project	**INF1st_W3**
W2	1	Multimedia presentation	**INF1st_W3**
Skills		**Project**	
U1	1	oral response	**INF1st_U9 INF1st_U10**
U2	1	report(s)	**INF1st_U10**

ASSESSMENT FORMS

Assessment criteria according to the scale:

very good	**5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a very gooddegree
good plus	**4,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a more than good degree
good	**4**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a good degree
sufficient plus	**3,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a fairly good degree
satisfactory	**3**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a satisfactory degree
unsatisfactory	**3**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice
pass	**pass**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice
failed	**nzal**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice

LITERATURE

Basic

1	Marcin Płonkowski, Android Studio. Creating mobile applications, Helion, 2017
2	Dawn Griffiths, David Griffiths, Android. Application programming. Use your head! 2nd edition, Helion, 2018
3	Bill Phillips, Chris Stewart, Kristin Marsicano, Brian Gardner, Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch Guides, 2019
4	Michael Fazio, Kotlin and Android Development featuring Jetpack. Build Better, Safer Android Apps, The Pragmatic Programmers, 2021
5	John Hoton, Android Programming for Beginners. Build in-depth, full-featured Android apps starting from zero programming experience - Third Edition, Packt Publishing, 2021
6	Neil Smyth, Android Studio Hedgehog Essentials - Java Edition, Payload Media, 2023.

STATE UNIVERSITY OF APPLIED SCIENCES IN GŁOGÓW

INSTITUTE OF ENGINEERING AND TECHNICAL SCIENCES

SYLLABUS / COURSE DESCRIPTION

BASIC INFORMATION ABOUT THE SUBJECT			
Name of the subject (module)	**Fundamentals of Machine Learning**	Course code	**25**

Name of the unit teaching the subject	**Institute of Engineering and Technology**		
Level of education	**First-cycle studies**	Profile	**Practical**
Field of study	**Computer Science**	Specialization	
Education module	**Field-specific**	Language of instruction	**English**
Semester	**IV**	Form of assessment	**Exam**

HOURLY DIMENSION OF DIDACTIC CLASSES		
FULL-TIME STUDIES		
Lecture	Project	Laboratory
15	30	30

TOTAL HOURLY DIMENSION OF CLASSES	
Student's independent work	75
Total	**150**
ECTS	**6**

PREREQUISITES

Programming Strategies III

COURSE OBJECTIVE

The aim of the course is to provide key knowledge and develop skills in the application of machine learning techniques using modern models and algorithms.

LEARNING OUTCOMES FOR THE COURSE

CODE	DESCRIPTION	LEARNING OUTCOME
	Knowledge	
W1	Be able to describe selected machine learning paradigms, methods, and algorithms.	**INF1st_W4**
W2	Can characterize basic machine learning techniques used in data analysis and signal processing.	**INF1st_W4**
	Skills	
U1	Be able to use machine learning models and algorithms in the construction of IT systems and during software development.	**INF1st_U10 INF1st_U11**
U2	Can assess the usefulness of various paradigms, machine learning methods, and related programming environments for solving practical problems.	**INF1st_U11**

EDUCATIONAL CONTENT

TOPIC	
Lecture	
1	Introduction to machine learning: general machine learning scheme, history of machine learning, applications of machine learning.
2	Presentation of the necessary elements of statistics, optimization, and programming for machine learning.
3	Models and criteria for their selection: criteria for evaluating modeling errors, overfitting and underfitting of models.
4	Machine learning methods and algorithms: data sets and their properties, categorization of machine learning methods, supervised learning - regression and classification.
5	Deep artificial neural networks, neuron structure, learning algorithms.
6	Convolutional neural networks (CNN) and recurrent neural networks (RNN)

7	Generative adversarial networks (GAN)
8	Time series modeling
9	Unsupervised learning: classification and dimensionality reduction
10	Applications of machine learning: image classification, signal processing, feature extraction, machine vision in robotics, robot trajectory tracking.
Laboratory	
1	Introduction to Python machine learning libraries
2	Essential elements of statistics, optimization, and programming for machine learning.
3	Models and criteria for their selection: criteria for evaluating modeling errors.
4	Machine learning methods and algorithms: data sets and their properties, supervised learning - regression and classification.
5	Deep artificial neural networks, neuron structure, learning algorithms.
6	Convolutional neural networks (CNN) and recurrent neural networks (RNN)
7	Generative adversarial networks (GAN)
8	Time series modeling
9	Unsupervised learning: classification and dimensionality reduction
10	Selected applications of machine learning: image classification, signal processing, feature extraction, machine vision in robotics, robot trajectory tracking.
Project	
1	Defining a design task using machine learning
2	Building an application structure using selected machine learning libraries
3	Implementation of the designed solution
4	Testing and corrections, and preparation of the final version of the project
5	Preparation and documentation of the results of the project task

TEACHING METHODS

Problem-based lecture, conventional lecture, case method, discussion, demonstration, laboratory exercises, project classes, work in a virtual environment

ASSESSMENT CRITERIA

The final grade for the course is the arithmetic mean of all forms of classes.

Each form of class must be assessed positively.

Detailed information will be provided during the first class when the syllabus is presented.

VERIFICATION OF LEARNING OUTCOMES

CODE		DESCRIPTION	LEARNING OUTCOME
Knowledge		**Lecture**	
W1	1	written exam	**INF1st_W4**
W2	1	written exam	**INF1st_W4**
Skills		**Lecture**	
U1	1	written exam	**INF1st_U10 INF1st_U11**
U2	1	written exam	**INF1st_U11**
Knowledge		**Laboratory**	
W1	1	Project	**INF1st_W4**
	2	report(s)	
	3	Multimedia presentation	
W2	1	Project	**INF1st_W4**
	2	report(s)	
	3	Multimedia presentation	
Skills		**Laboratory**	
U1	1	Project	**INF1st_U10 INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	
U2	1	Project	**INF1st_U11**
	2	report(s)	
	3	Multimedia presentation	

Knowledge		Project	
W1	1	Project	**INF1st_W4**
	2	Multimedia presentation	
W2	1	Project	**INF1st_W4**
	2	Multimedia presentation	
Skills		**Project**	
U1	1	Project	**INF1st_U10 INF1st_U11**
	2	Multimedia presentation	
U2	1	Project	**INF1st_U11**
	2	Multimedia presentation	

ASSESSMENT FORMS

Assessment criteria according to the scale:

very good	**5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a very gooddegree
good plus	**4,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a more than good degree
good	**4**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a good degree
sufficient plus	**3,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a fairly good degree
satisfactory	**3**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a satisfactory degree
unsatisfactory	**3**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice
pass	**pass**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice
failed	**nzal**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice

LITERATURE

Basic

1	Kyle Gallatin, Chris Albon, Machine Learning with Python. Recipes. From data preparation to deep learning, Helion, 2024
2	Leszek Albrzykowski, Machine Learning. Elements of Mathematics in Data Analysis, Helion, 2023
3	I. Gupta, G. Nagpal, Artificial Intelligence and Expert Systems. Techniques and Applications for Problem Solving, Mercury Learning and Information, 2020
4	Marcin Szeliga, Practical Machine Learning, PWN, 2019
5	Stanisław Osowski, Robert Szmurło, Mathematical Models of Machine Learning in MATLAB and PYTHON, Warsaw University of Technology Publishing House, 2024.

STATE UNIVERSITY OF APPLIED SCIENCES IN GŁOGÓW

INSTITUTE OF ENGINEERING AND TECHNICAL SCIENCES

SYLLABUS / COURSE DESCRIPTION

BASIC INFORMATION ABOUT THE SUBJECT			
Name of the subject (module)	**Computer Networks II**	Course code	**31**

Name of the unit teaching the subject	**Institute of Engineering and Technology**		
Level of education	**First-cycle studies**	Profile	**Practical**
Field of study	**Computer Science**	Specialization	
Education module	**Field-specific**	Language of instruction	**English**
Semester	**IV**	Form of assessment	**Exam**

HOURLY DIMENSION OF DIDACTIC CLASSES		
FULL-TIME STUDIES		
Lecture	Project	Laboratory
15	30	30

TOTAL HOURLY DIMENSION OF CLASSES	
Student's independent work	75
Total	**150**
ECTS	**6**

PREREQUISITES

Computer Networks I

COURSE OBJECTIVE

The aim of the course is to provide knowledge and develop skills in the field of computer networks: -IPv6 address space allocation -technologies and protocols used to ensure quality of service in computer networks -NAT translation techniques -advanced configuration of routers and switches -DHCPv4 and DHCPv6 protocols -LAN design

LEARNING OUTCOMES FOR THE COURSE

CODE	DESCRIPTION	LEARNING OUTCOME
	Knowledge	
W1	Able to creatively develop the division of IPv6 address space	**INF1st_W7**
W2	Knows IPv6 addressing systems	**INF1st_W7**
W3	Knows the technologies and protocols used to ensure quality of service in computer networks.	**INF1st_W7**
	Skills	
U1	Is able to apply NAT translation techniques.	**INF1st_U14**
U2	Knows the structure and is able to perform advanced configuration of routers and switches.	**INF1st_U14**
U3	Is able to identify potential threats to computer network security and is able to counteract them by using various security techniques, e.g., ACL	**INF1st_U14**
U4	Is able to select the appropriate routing protocol necessary for optimal routing within and between autonomous systems.	**INF1st_U14**
U5	Knows and is able to configure VLAN networks and STP protocols.	**INF1st_U14**
U6	Knows IPV4 and IPV6 addressing systems and is able to configure DHCPv4 and DHCPv6 protocols.	**INF1st_U14**
U7	Is able to design a LAN network	**INF1st_U14**

EDUCATIONAL CONTENT	
TOPIC	
Lecture	
1	Virtual LANs.
2	Routing between VLANs.
3	NAT translation.
4	STP protocol and its variants.
5	FHRP virtual default gateway protocols: HSRP and GLBP
6	Designing a switched network with redundant connections. Etherchannel link aggregation.
7	Wireless data transmission standards: WLAN (WiFi), Bluetooth, ZigBee, WiMax, GSM.
8	WLAN configuration: SSID, WPA, WPA2, WPA3, WPS protocols. Integration of WiFi networks with LAN.
Laboratory	
1	Virtual LANs.
2	Routing between VLANs.
3	NAT translation.
4	STP protocol and its variants.
5	FHRP virtual default gateway protocols: HSRP and GLBP
6	Designing a switched network with redundant connections. Etherchannel link aggregation.
7	WLAN configuration: SSID, WPA, WPA2, WPA3, WPS protocols. Integration of WiFi networks with LAN.
Project	
1	1. Defining the project task. Specification of the goal, assumptions, functional and non-functional requirements.
2	2. Defining the application structure. Defining (writing down) use cases.
3	3. Implementation of the designed solution
4	4. Testing and corrections, and preparation of the final version of the project
5	5. Preparation of project documentation. Project completion.

TEACHING METHODS
Problem-based lecture, conventional lecture, case method, discussion, demonstration, laboratory exercises, project classes, work in a virtual environment

ASSESSMENT CRITERIA
The final grade for the course is the arithmetic mean of all forms of classes.
Each form of class must be assessed positively.
Detailed information will be provided during the first class when the syllabus is presented.

VERIFICATION OF LEARNING OUTCOMES			
CODE		**DESCRIPTION**	**LEARNING OUTCOME**
Knowledge	**Lecture**		
W1	1	written exam	**INF1st_W7**
W2	1	written exam	**INF1st_W7**
W3	1	written exam	**INF1st_W7**
Skills	**Lecture**		
U1	1	written exam	**INF1st_U14**
U2	1	written exam	**INF1st_U14**
U3	1	written exam	**INF1st_U14**
U4	1	written exam	**INF1st_U14**
U5	1	written exam	**INF1st_U14**
U6	1	written exam	**INF1st_U14**
U7	1	written exam	**INF1st_U14**
Knowledge	**Laboratory**		
W1	1	Project	**INF1st_W7**
	2	report(s)	
	3	Multimedia presentation	
W2	1	Project	**INF1st_W7**
	2	report(s)	
	3	Multimedia presentation	
W3	1	Project	**INF1st_W7**

	2	report(s)	
	3	Multimedia presentation	
Skills	**Laboratory**		
U1	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
U2	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
U3	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
U4	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
U5	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
U6	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
U7	1	Project	**INF1st_U14**
	2	report(s)	
	3	Multimedia presentation	
Knowledge	**Project**		
W1	1	Project	**INF1st_W3**
W2	1	Multimedia presentation	**INF1st_W3**
Skills	**Project**		
U1	1	oral response	**INF1st_U9 INF1st_U10**
U2	1	report(s)	**INF1st_U10**

ASSESSMENT FORMS

Assessment criteria according to the scale:

very good	**5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a very gooddegree
good plus	**4,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a more than good degree
good	**4**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a good degree
sufficient plus	**3,5**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a fairly good degree
satisfactory	**3**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice to a satisfactory degree
unsatisfactory	**3**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice
pass	**pass**	the student knows, understands, and explains the intended learning outcomes and is able to apply them in practice
failed	**nzal**	the student does not know, understand, or explain the intended learning outcomes and is unable to apply them in practice

LITERATURE

Basic

1	Training materials: CISCO CCNA, available through the CISCO NETWORKING ACADEMY portal
2	Adam Józefiok: On the way to CCNA. Part I, Helion, Gliwice, 2021
3	Adam Józefiok: On the way to CCNA. Part II, Helion, Gliwice, 2021
4	Glen D. Singh, Implementing and Administering Cisco Solutions: 200-301 CCNA Exam Guide. Begin a successful career in networking with CCNA 200-301 certification, Packt Publishing, 2020
5	Józefiok A.: Building computer networks on Cisco switches and routers, Helion, Gliwice, 2012.

STATE UNIVERSITY OF APPLIED SCIENCES IN GŁOGÓW

INSTITUTE OF ENGINEERING AND TECHNICAL SCIENCES

SYLLABUS / COURSE DESCRIPTION

BASIC INFORMATION ABOUT THE SUBJECT			
Name of the subject (module)	**Fundamentals of computer graphics**	Course code	**33**

Name of the unit teaching the subject	**Institute of Engineering and Technology**		
Level of education	**First-cycle studies**	Profile	**Practical**
Field of study	**Computer Science**	Specialization	
Education module	**Field-specific**	Language of instruction	**English**
Semester	**II**	Form of assessment	**Pass with a grade**

HOURLY DIMENSION OF DIDACTIC CLASSES		
FULL-TIME STUDIES		
Lecture	Project	Laboratory
15	30	30

TOTAL HOURLY DIMENSION OF CLASSES	
Student's independent work	75
Total	**150**
ECTS	**6**

COURSE OBJECTIVE

The aim of the course is to provide knowledge and develop skills in the following areas: graphic formats and related editing programs, video file processing, and 3D graphics and its application in multimedia projects.

LEARNING OUTCOMES FOR THE COURSE

CODE	DESCRIPTION	LEARNING OUTCOME
	Knowledge	
W1	The student is able to list and characterize graphic file formats, their specific features, and programs that operate on these formats.	**INF1st_W6**
W2	Knows the theoretical basics of digital sound processing.	**INF1st_W6**
W3	Can list and describe key issues in the field of 3D graphics and its application in multimedia projects.	**INF1st_W6**
	Skills	
U1	Is able to use color profiles in computer graphics and characterize the role of color management.	**INF1st_U13**
U2	Can correctly record audio material and subject it to basic processing.	**INF1st_U13**
U3	Can use virtual instruments to create simple sound effects.	**INF1st_U13**
U4	Is able to make a simple video taking into account the lighting of the scene.	**INF1st_U13**

EDUCATIONAL CONTENT

TOPIC	
Lecture	
1	Introduction. Presentation of expected learning outcomes and literature. Basics of color management. The role of color profiles. Editing spaces.
2	Basics of design. Fonts and color schemes.
3	Input/output devices.
4	Graphic file types. File compression.
5	Basics of digital sound.
6	Basics of material licensing.

Laboratory	
1	Color management. Creating a color profile for a monitor and scanner. Using color profiles
2	Basics of digital sound – noise reduction, simple filters. Virtual instruments, effect plug-ins
3	Basics of photography. Product photography, portrait photography. Basics of working with RAW files. Image metadata management and modification.
4	Lighting control and basics of the DMX protocol.
5	Basics of videography. Working with a green screen.

Project	
1	1. Defining the project task. Specification of the goal, assumptions, functional and non-functional requirements.
2	2. Defining the application structure. Defining (writing down) use cases.
3	3. Implementation of the designed solution
4	4. Testing and corrections, and preparation of the final version of the project
5	5. Preparation of project documentation. Project completion.

TEACHING METHODS

Problem-based lecture, conventional lecture, case method, discussion, demonstration, laboratory exercises, project classes, work in a virtual environment

ASSESSMENT CRITERIA

The final grade for the course is the arithmetic mean of all forms of classes.

Each form of class must be assessed positively.

Detailed information will be provided during the first class when the syllabus is presented.

VERIFICATION OF LEARNING OUTCOMES

CODE		DESCRIPTION	LEARNING OUTCOME
		Knowledge | **Lecture**	
W1	1	final test	**INF1st_W6**
W2	1	final test	**INF1st_W6**
W3	1	final test	**INF1st_W6**
		Skills | **Lecture**	
U1	1	final test	**INF1st_U13**
U2	1	final test	**INF1st_U13**
U3	1	final test	**INF1st_U13**
U4	1	final test	**INF1st_U13**
		Knowledge | **Laboratory**	
W1	1	Project	**INF1st_W6**
	2	report(s)	
	3	Multimedia presentation	
W2	1	Project	**INF1st_W6**
	2	report(s)	
	3	Multimedia presentation	
W3	1	Project	**INF1st_W6**
	2	report(s)	
	3	Multimedia presentation	
		Skills | **Laboratory**	
U1	1	Project	**INF1st_U13**
	2	report(s)	
	3	Multimedia presentation	
U2	1	Project	**INF1st_U13**
	2	report(s)	
	3	Multimedia presentation	
U3	1	Project	**INF1st_U13**
	2	report(s)	
	3	Multimedia presentation	
U4	1	Project	**INF1st_U13**

	2	report(s)	
	3	Multimedia presentation	
		Knowledge	**Project**
W1	1	Project	**INF1st_W3**
W2	1	Multimedia presentation	**INF1st_W3**
		Skills	**Project**
U1	1	oral response	**INF1st_U9 INF1st_U10**
U2	1	report(s)	**INF1st_U10**

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LITERATURE

Basic

1	Fraser, B., Professional Color Management, 2nd edition, Helion, 2006,
2	Ball, J., Carman, R., Filming with a digital SLR camera, Łódź, Galaktyka Publishing House, 2011,
3	Mroczek, A., A Book About Photography, Helion, 2009,
4	Scott, K. Secrets of a Digital Photography Master. Professional Photos Step by Step, Helion 2021.
5	Varis, L., Body. Professional Lighting and Retouching in Portrait Photography, Gliwice, Helion, 2010,
6	Sztekmiler, K., Fundamentals of Sound Reinforcement and Recording. A Handbook for Acousticians, Warsaw, WKŁ, 2011.
7	Godse A. P., Dr. Godse D. A. Computer Graphics: Concepts and Algorithms. Technical Publications 2020.
8	Marschner S., Shirley P. Fundamentals of Computer Graphics: International Student Edition. CRC Press 2022.
9	Bart Van de Wiele. Adobe Photoshop, Illustrator, and InDesign. Collaboration and Workflow. Official Handbook. Helion 2024.
10	Yewdall D. L. Sound in Film. Theory and Practice. Published by Wojciech Marzec 2011,
11	Frasier B., Murphy C., Real world color management, 2nd ed. Peachpit Press 2004.