SYLLABUS

1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Electronics, Telecommunications and Information Technology
1.3 Department	Communications
1.4 Field of study	Electronic Engineering, Telecommunications and Information Technologies
1.5 Cycle of study	Bachelor of Science
1.6 Program of study / Qualification	Telecommunications Technologies and Systems/ Engineer Applied Electronics/Engineer
1.7 Form of education	Full time
1.8 Subject code	TST-E11.00/EA-E11.00

2 Data about the subject

2.1 Subject name	Computer Programming and Programming Languages 2						
2.2 Subject area	Theoretical area Methodological area Analytic area						
2.3 Course responsible	Prof. Mircea-Florin VAIDA, Ph.D. - Mircea.Vaida@com.utcluj.ro						
2.4 Teacher in charge with laboratory	Prof. Mircea-Florin VAIDA, Ph.D. - Mircea.Vaida@com.utcluj.ro Assist.Prof. Cosmin STRILETCHI, Ph.D Cosmin.Striletchi@com.utcluj.ro						
2.5 Year of study	1	2.6 Semester	2	2.7 Assessment	E	2.8 Subject category	DF/DI

3. Estimated total time

3.1 Number of hours per week	4	of which: 3.2 course	2	3.3 seminar / laboratory	2
3.4 To Total hours in the curriculum	56	of which: 3.5 course	28	3.6 seminar / laboratory	28

Distribution of time	hours
Manual, lecture material and notes, bibliography	34
Supplementary study in the library, online specialized platforms and in the field	9
Preparation for seminars / laboratories, homework, reports, portfolios and essays	20
Tutoring	2
Exams and tests	3
Other activities:	1

3.7 Total hours of individual study	69
3.8 Total hours per semester	125
3.9 Number of credit points	5

4. Pre-requisites (where appropriate)

4.1 curriculum	Basic knowledge from: - Computer programming – Languages 1
4.2 competence	Basic knowledge of algorithms

5. Requirements (where appropriate)

5.1. for the course	Video-projector, screen, whiteboard
5.2. for the seminars / laboratories / projects	PCs with Internet access

6. Specific competences

Professional competences	C3. Application of the basic knowledge, concepts and methods regarding the architecture of computer systems, microprocessors, microcontrollers, languages and programming techniques C4. Design, implementation and operation of data, voice, video and multimedia services. This is based on the understanding and the application of fundamental concepts in telecommunications and transmission of information C5. Selecting, installing, configuring and operating fixed or mobile telecommunications equipment. Equipping a site with usual telecommunications networks
Transversal competences	N/A

7. Discipline objectives (as results from the key competences gained)

7.1 General objective	Development of competences in basic algorithms and C++ OO programming language
7.2 Specific objectives	1. Theoretical knowledges about basic OO programming in C++ language. 2. Practical abilities to use Visual Studio C++ IDE for OO and algorithms applications.

8. Contents

8.1 Lecture (syllabus)	Teaching methods	Notes
1 Recursive programming in C/C++. Stack management.	Presentations, discussions	Video - projector
2 Recursive and non-recursive programming methods. Backtracking.		
2 Recursive and non-recursive programming methods. Variants of Backtracking method. Divide et impera method. Sorting and searching algorithms. Simple sorting: selection, insertion, interchange.		
3 Advanced sorting: merge sort, quick-sort. Introduction in Object Oriented Programming, OOP.		
4 Classes, Objects, members of a class. Constructors, destructors, methods calling in C++. Copy constructor, arrays of objects, visibility domain.		
5 Friend class and functions in C++. Static members. Struct and union in C++. Overloading methods.		
6 Overloading operators in C++. Inheritance in C++. Simple and multiple inheritances.		
7 Virtual classes and methods. Abstract classes.		
8 I/O operations in C++. iostream library, I/O with format, I/O state, manipulators functions		

9 ostream, istream si fstream classes. Overloading I/O operators. C++ files.		
10 Stack, queue, sequential lists. Dynamic data structures: Linked lists: SLL, DLL; Trees		
11 Generic programming in C++.		
12 STL library		
13 Theoretical evaluation		

Bibliography
1. Vaida M., Bazele dezvoltarii aplicatiilor software in electronica si telecomunicatii, curs, litografia UTC-N, 1997
2. Mircea-Florin Vaida, Petre G. Pop, Cosmin Striletchi, Ligia Chiorean, Calin G. Login, Tehnologii avansate privind dezvoltarea aplicatiilor software in limbajul C/C++, Casa Cartii de Stiinta, 2006
3. Ligia Chiorean, Mircea-Florin Vaida, Petre G. Pop, Cosmin Striletchi, , Elemente de bază şi obiectuale privind dezvoltarea aplicaţiilor în limbajul de programare C/C++, UTPress, 2007/2008
4. Mircea-Florin Vaida, Ligia-Domnica Chiorean, Lenuța Alboaie, Petre Gavril Pop, Cosmin Strilețchi, Kuderna-Iulian Benţa, Programarea în limbajul C/C++ cu elemente C++1y. Programare web C++, Casa Cartii de Stiinta, Cluj-Napoca, 2016
5. Ligia-Domnica Chiorean, Kuderna-Iulian Benţa, Mircea-Florin Vaida, Petre Gavril Pop, Cosmin Strileţchi, C/C++ - Ghid teoretic si practic, Casa Cartii de Stiinta, Cluj-Napoca, 2016

8.2 Seminar / laboratory / project	Teaching methods	Notes
3 Macro functions. Inline functions. Functions with implicit parameters. Functions with a variable number of parameters. Overloading functions	Experiments, tests using PC's	Network PC's
4 Recursive functions.		
5 Recursive and non-recursive programming methods: Backtracking, divide et impera: searching techniques.		
6 Sorting techniques.		
7 Classes, objects, class members.		
8 The access to a class's members		
9 Constructors. Destructors. Object arrays		
10 Friend functions and classes. Static members.		
11 Operators overloading. Simple and multiple inheritances		
12 Virtual methods and classes. Abstract classes.		
13 Input/output in C++. Overloading the I/O operators. Files in C++. Homework evaluation		
14 Final practical test and evaluation.		

Bibliography
-English web courses site, https://helios.utcluj.ro/lab/index.php (english+romanian)
-Lab. Support on the dedicated site, https://helios.utcluj.ro/lab/index.php (english+romanian)

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

The discipline content and the acquired skills are in agreement with the expectations of the professional Competences acquired will be used in the following COR occupations (Electronics Engineer; Telecommunications Engineer; Electronics Design Engineer; System and Computer Design Engineer; Communications Design Engineer) or in the new occupations proposed to be included in COR (Sale Support Engineer; Multimedia Applications Developer; Network Engineer; Communications Systems Test Engineer; Project Manager; Traffic Engineer; Communications Systems Consultant).

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Theoretical written and oral test with questions/code	Written/oral test (T=33%)	T = 33%
10.5 Seminar/ Laboratory	Solving a problem P on a computer (1 hour). The laboratory L will also be evaluated	Lab. evaluations and computer test (P=34%, L=33%)	P+L = 67%
10.6 Minimum standard of performance			
✓ The final grade (N) is calculated as average of marks obtained in the evaluation of ongoing activities and application type: N = (T + L + P) / 3.0. The condition for obtaining the ECTS credits is that N and all components of the final grade to be higher than or equal to 5 (five).			

Date of filling in:	**Responsible**	**Title First name SURNAME**	**Signature**
20.06.2023	Course	Professor Mircea-Florin VAIDA, Ph.D.	
	Applications	Professor Mircea-Florin VAIDA, Ph.D.	
		Assist. Professor Cosmin STRILETCHI, Ph.D.	

Date of approval in the Council of the Communications Department 11.07.2023	Head of Communications Department Prof. Virgil DOBROTA, Ph.D.
Date of approval in the Council of the Faculty of Electronics, Telecommunications and Information Technology 12.07.2023	Dean Prof. Ovidiu POP, Ph.D.