SYLLABUS

1. Data about the program of study

1.1 Institution	The Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Automation and Computer Science
1.3 Department	Computer Science
1.4 Field of study	Computer Science and Information Technology
1.5 Cycle of study	Bachelor of Science
1.6 Program of study / Qualification	Computer science / Engineer
1.7 Form of education	Full time
1.8 Subject code	25.

2. Data about the subject

2.1 Subject name	***Fundamental Programming Techniques***
2.2 Course responsible / lecturer	Lect. dr. eng. Cristina Bianca Pop - Cristina.Pop@cs.utcluj.ro
2.3 Teachers in charge of seminars / laboratory / project	Lect. dr. eng. Cristina Bianca Pop Assoc prof. dr. eng. Viorica Chifu - Viorica.Chifu@cs.utcluj.ro Lect. dr. eng. Marcel Antal - marcel.antal@cs.utcluj.ro

2.4 Year of study	II	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E

2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*	DF
	DI – Impusă, DOp – opțională, DFac – facultativă	DI

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminars		Laboratory	2	Project	
3.2 Number of hours per semester	56	of which:	Course	28	Seminars		Laboratory	28	Project	

3.3 Individual study:	
(a) Manual, lecture material and notes, bibliography	10
(b) Supplementary study in the library, online and in the field	10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	20
(d) Tutoring	
(e) Exams and tests	4
(f) Other activities:	

3.4 Total hours of individual study (suma (3.3(a)...3.3(f)))	44
3.5 Total hours per semester (3.2+3.4)	100
3.6 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1 Curriculum	Fundamentals of Object Oriented Programming, Data Structures and Algorithms
4.2 Competence	Knowledge of Object Oriented Programming

5. Requirements (where appropriate)

5.1. For the course	Blackboard, projector, computer, internet; *Microsoft Teams platform for online teaching; Web site with course materials*
5.2. For the applications	Blackboard, projector, computer, internet, specific software; *Microsoft Teams platform for online teaching; Web site with laboratory materials*

6. Specific competence

6.1 Professional competences	**C4 -** Improving the performances of the hardware, software and communication systems **C4.1** - Identifying and describing the defining elements of the performances of the hardware, software and communication systems

	C4.2 - Explaining the interaction of the factors that determine the performances of the hardware, software and communication systems **C4.3 -** Applying the fundamental methods and principles for increasing the performances of the hardware, software and communication systems **C4.4** - Choosing the criteria and evaluation methods of the hardware, software, and communication systems performance **C4.5** - Developing professional solutions for hardware, software and communication systems based on performance optimization
6.2 Cross competences	N/A

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

7.1 General objective	Knowledge and using of object-oriented programming techniques for the development of professional software applications
7.2 Specific objectives	- to use programming techniques for the design of classes and interfaces, including contracts and invariants - to use programming techniques for code reuse by inheritance and polymorphism - to use generic and streams programming techniques for collection processing - to use programming techniques for reflection, design patterns and frameworks for reusing design solutions - to apply the SOLID design principles and java threads - to use object-oriented and functional programming in an integrated approach for the development of flexible and efficient programs - to use lambda expressions and to be able to perform processing operations on streams

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Introduction – Software construction and programming paradigms	2	- Using modern multimedia teaching methods and direct access to internet face to face . Challenging questions during lecturers	N/A
Design view: UML diagrams	2		
Object oriented programming paradigms	2		
Programming techniques with threads	2		
Programming techniques with abstract classes and interfaces	2		
Composition techniques and reflection	2		
Class design techniques	2		
Programming techniques using contracts and invariants	2		
SOLID principles, Inversion of Control, and frameworks	2		
Flexibility and reuse through design patterns	4		
Generic programming techniques	2		
Lambda Expressions and Stream processing	4		
Bibliography 1. B. Eckel, On Java 8, MindView LLC, 2017 2. E. Gamma, R. Helm, R. Johnson, J. Vlissides - Design Patterns, Addison Wesley Professional, 1994 3. K. Sharan, P. Späth, More Java 17: An In-Depth Exploration of the Java Language and Its Features 3rd Edition, Apress, 2021 4. R. Urma, M. Fusco, A. Mycroft, Modern Java in Action: Lambdas, streams, functional and reactive programming, 2nd Edition, Manning, 2018 5. Online course materials provided by the course lecturer 6. Online: - http://docs.oracle.com/javase/tutorial/index.html - http://stackoverflow.com/			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes

Intro to lab resources and requirements	2	Short presentation of the laboratory assignments, discussions about the assignments, assignments implementation on the computer, face-to-face.	N/A
Assignment 1 – Programming techniques with inheritance and polymorphism	4		
Assignment 2 – Programming techniques with threads	4		
Assignment 3 - Programming techniques with databases, design patterns and reflection	6		
Assignment 4 – Programming techniques with Java Collection Framework, lambda expressions and stream processing	6		
Lab Evaluation	4		
Bibliography - http://docs.oracle.com/javase/tutorial/index.html - http://stackoverflow.com/			

[*] Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.

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

Fundamental Programming Techniques is a subject of the domain "Computers and Information Technology". It teaches students to apply object-oriented programming techniques in designing and implementing of software applications. The content was developed based on the analysis of similar disciplines from other universities as well as based on the requirements of the IT employees. The content was also evaluated by Romanian governmental agencies CNEAA and ARACIS.

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	The knowledge and usage of programming techniques presented during course lectures; presence and interaction during lectures	Written exam, face to face.	50%
Seminar	-	-	-
Laboratory	- Ability to effectively design and implement object-oriented programs - Ability to use programming techniques in practice - Quality of the assignments’ code and documentation - Activity and presence during lab sessions	- Assessment of laboratory assignments during the semester face to face.	50%
Project	-	-	-
Minimum standard of performance: -To be able to use object-oriented programming techniques in designing and implementing software applications Grade: 50% laboratory + 50% final exam Conditions for participating in the final exam: Laboratory ≥ 5 Handing over all laboratory assignments and obtain a minimum grade of 5 on each assignment; At least 11 laboratory presences. Conditions for promotion: final exam ≥ 5 Handing overdue laboratory assignments: in an overdue session a student can hand over 1 of the unfinished semester laboratory assignments.			

Date of filling in: 30.06.2023	**Teachers**	**Title First name Last name**	**Signature**
	Course	Lect. dr. eng. Cristina Bianca Pop	
	Applications	Lect. dr. eng. Cristina Bianca Pop	
		Assoc. prof. dr. eng. Viorica Chifu	
		Lect. dr. eng. Marcel Antal	

Date of approval in the department	Head of department, Prof. dr. eng. Rodica Potolea
Date of approval in the Faculty Council	Dean, Prof. dr. eng. Liviu Miclea