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				Prof. dr. eng. Ioan Salomie - Ioan.Salomie@cs.utcluj.ro	
2.3 Teachers in charge of seminars/ laboratory/ project				Sl. dr. eng. Cristina.Pop, S.l.dr.ing. Marcel Antal	
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										16
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										14
(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
4.2 Competence	Knowledge of Object Oriented Programming

5. Requirements (where appropriate)

5.1. For the course	Blackboard, projector, computer, internet; *From 16.03.2020 we use the online platforms Skype for Business and Discord as well as the web site for course materials: http://coned.utcluj.ro/~salomie/PT_Lic*
5.2. For the applications	Computers, specific software, internet; *From 16.03.2020 we use the online platforms Skype for Business and Discord as well as the web site (for lab materials): http://coned.utcluj.ro/~salomie/PT_Lic*

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 performances of the hardware, software and communication systems **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 designing of classes and interfaces, including contracts and invariants; -to use programming techniques for code reuse by inheritance and polymorphism -to use generic programming techniques for collection processing -to use programming techniques for reflection and event based -to use programming techniques for concurrent and multi-threading programming -to use object-oriented and functional programming in an integrated approach for the development of flexible and efficient programs -to use design patterns and frameworks -to use programming techniques for performance and software maintenance

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Programming techniques with classes and interfaces	2	-Using modern multimedia teaching methods and direct access to internet; -Online lecture presentations and discussions using the Skype for Business platform and course web site -Challenging questions during lecturers -Students are invited to collaborate in research projects -Personal assistance hours the semester and before the exam	
Programming techniques using inheritance and polymorphism	2		
Programming techniques using contracts and invariants	2		
Generic programming techniques	2		
Reflection techniques	2		
Event-driven techniques	2		
Collection programming techniques	2		
Concurrent and multithreading techniques	2		
Flexibility and reuse through design patterns	2		
Main design patterns of type creational, structural and behavioral	2		
Flexibility and reuse through frameworks	2		
Lambda Expressions and Stream processing	2		
Multiparadigm (functional and OO) programming techniques	2		
Programming techniques for efficiency and performance	2		

Bibliography

1. Ioan Salomie - Tehnici Orientate Obiect, Editura Albastra, Microinformatica, 1995
2. Eric Gamma, Helm, Johnson, Vlissides - Design Patterns, Addison Wesley, 1995 (translated into Romanian by Teora Publ. as "Sabloane de Proiectare")
3. Joshua Bloch - Effective Java, 2/e Addison Wesley, 2008
4. Ioan Salomie, Note de Curs, http://www.coned.utcluj.ro/~salomie/TP

8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes

Intro to lab resources and requirements	2	-Lab sessions with pre-defined exercises and assignments -Using modern multimedia teaching methods and direct access to internet, online presentations, discussions and evaluations by using the Skype for Business, Discord and GitLab platforms as well as the course site. -Students are invited to collaborate in research projects -Personal assistance hours during the semester and before the exam	
Assignment 1 - Programming with inheritance and polymorphism	4		
Assignment 2 - Programming with contracts (pre and post conditions) and invariants	4		
Assignment 3 Programming with multiple threads	4		
Assignment 4 – Programming with design patterns	4		
Assignment 5 – Programming with generics and Java Collection Framework	4		
Assignment 6 – Multi-paradigm programming	4		
Lab Evaluation	2		
Bibliography - Steve McConnell - Code Complete, 2/e, Microsoft Press, 2004 - 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	How the students are using programming techniques for: (i) designing of classes and interfaces, including contracts and invariants; (ii) promote code reuse by inheritance and polymorphism; (iii) using generic programming techniques for collection processing; (iv) using programming techniques for concurrent and multi-threading programming; (v) using object-oriented and functional programming in an integrated approach for the development of flexible and efficient programs; (vi) using design patterns and frameworks	written exam, online supervised by using Skype for Business platform	60%
Seminar			
Laboratory	-Abilities to effectively specify, design, implement and test quality and	-Assessment of programming assignments during the	40%

	performance object – oriented programs -Quality of assessment deliverables -Activity during lab sessions -Presence to lab sessions	semester using the Discord and GitLab platforms as well as knowledge evaluation during the online written exam supervised through the Skype for Business platform	
Project			

Minimum standard of performance:
-To be able to use object-oriented programming techniques in designing and implementing software applications

Grade: 40% laboratory + 60% 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

Date of filling in:	**Titulari**	**Titlu Prenume NUME**	**Semnătura**
	Course	Prof.dr.eng. Ioan Salomie	
	Applications	S.l.dr.ing. Cristina Pop	
		S.l.dr.ing. Marcel Antal	

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