

## 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	<b>Computer Science and Information Technology</b>
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	15.

### 2. Data about the subject

2.1 Subject name	<b>Electronic Measurements and Sensors</b>				
2.2 Course responsible/lecturer	Assoc. Professor Rodica Holonec, Phd eng				
2.3 Teachers in charge of seminars/ laboratory/ project	Lecturer Septimiu Crisan, Phd eng				
2.4 Year of study	II	2.5 Semester	1	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				DD
	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										15
(b) Supplementary study in the library, online and in the field										8
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										15
(d) Tutoring										3
(e) Exams and tests										3
(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	
4.2 Competence	Basic Electrical circuit theory, Basic Electronics, Analysis methods for electronic circuits; General Physics

### 5. Requirements (where appropriate)

5.1. For the course	Amphitheatre equipped with blackboard, computer, projector and sound system
5.2. For the applications	Laboratory room equipped with specific measuring devices and sensors

### 6. Specific competence

6.1 Professional competences	<p><b>C1</b> – Operating with basic Mathematical, Engineering and Computer Science concepts (2 credits)</p> <p><b>C1.1</b> – Recognizing and describing concepts that are specific to the fields of calculability, complexity, programming paradigms, and modeling computational and communication systems</p> <p><b>C1.2</b> – Using specific theories and tools (algorithms, schemes, models, protocols, etc.) for explaining the structure and the functioning of hardware, software and</p>
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	<p>communication systems</p> <p><b>C1.3</b> – Building models for various components of computing systems</p> <p><b>C1.4</b> – Formal evaluation of the functional and non-functional characteristics of computing systems</p> <p><b>C1.5</b> – Providing a theoretical background for the characteristics of the designed systems</p> <p><b>C2</b> – Designing hardware, software and communication components (2 credits)</p> <p><b>C2.1</b> – Describing the structure and functioning of computational, communication and software components and systems</p> <p><b>C2.2</b> – Explaining the role, interaction and operation of hardware, software and communication components</p> <p><b>C2.3</b> – Construction of hardware and software components of computing systems using design methods, languages, algorithms, data structures, protocols and technologies</p> <p><b>C2.4</b> – Evaluating the functional and non-functional characteristics of the computing systems using specific metrics</p> <p><b>C2.5</b> – Implementation of hardware, software and communication components</p>
6.2 Cross competences	N/A

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

7.1 General objective	To provide a foundation in important topics of engineering system instrumentation such as: metrology, measurement techniques, electronic measurement devices, sensors principles and applications , virtual instrumentation
7.2 Specific objectives	To provide principle knowledge, practical training and measurement best practice regarding the instrumentation systems To provide knowledge about sensors in order to perform the documentation, implementation, and development of complex equipment and measurement devices.

### 8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Measurement fundamentals. Terms and definitions. The structure of a complex instrumentation system. Sensors	2	Presentation, heuristic conversation, exemplification, problem presentation, teaching exercise, case study, formative evaluation	Projector, blackboard
Fundamentals of Metrology. Measurement Units. Measurements Standards. Traceability. Measurement terminology. Errors and Uncertainties. The Measuring Instrument Specifications.	2		
Random Errors Analysis. Basic Concepts in Probability. Normal Distribution. Central Limit Theorem. The Evaluation of Uncertainties in Measurements	2		
Meters. Analog Meters-Classifications and Symbols. Types of Analog Instruments. Voltmeters. Ammeters. Wattmeters, Ohmmeters	2		
Measurements with Bridges and Potentiometers. Wheatstone Bridge. Principle. Strain gauge measurement bridges. Types of AC bridges. Potentiometers.	2		
Amplification in Instrumentation. Operational Amplifiers. Basic circuits. Instrumentation Amplifiers. Current to Voltage, Resistance to Voltage Converters. Bridge Amplifiers.	2		
Electronic Voltmeters. DC Electronic Voltmeters. Types of AC Electronic Voltmeters. Lock-in Amplifiers. Principles and Applications	2		
Electronic Counters. Digital measurement of frequency and time	2		
Digital Multi-meters (DMM). Computing Measuring Systems. Data Acquisition Boards. Sample and Hold Circuits. Nyquist theorem.	2		
Data Acquisition Boards Components. Digital to Analog Converters.	2		

Analog to Digital Converters. Virtual Instruments			
The Analog and Digital Oscilloscopes	2		
Transducers, Sensors and Actuators. Terminology. Principles and Classifications. Analog and Digital Sensors.	2		
Analog Sensors. Potentiometers. Variable-Inductance and Capacitance Sensors. Temperature sensors.	2		
Digital sensors. Encoders. Optical Sensors: Fiber-Optic Sensors, Light sensors	2		
Bibliography			
1. Rodica Holonec, Electrical Measurements and Instrumentation, Editura Mediamira, Cluj-Napoca, 2003, 259 p, ISBN 973-9357-42-3			
2. Todoran, Gh., Copandean, R; Masurari Electrice si Electronice. Editura Mediamira; Cluj Napoca. 2003. 282p. ISBN 973-9357-61-X.			
3. Dragomir, N.D., TÂRNOVAN, I.G., Crişan, T.E. – Electrical Measurement of Non Electric Quantities. Vol. I. Editura MEDIAMIRA, Cluj-Napoca, România, 2002. ISBN 973-9358-75-6.			
4. TÂRNOVAN, I. G. – Metrologie electrică și instrumentație. Editura MEDIAMIRA, Cluj-Napoca, România, 2003. ISBN 973-9357-39-3.			
5. Munteanu, R., TÂRNOVAN, I.G., Dragomir, N.D., Popovici, O. – Electrotehnică și convertoare energetice. Editura MEDIAMIRA, Cluj-Napoca, România, 1997.			
6. <a href="http://users.utcluj.ro/~tarnovan/Electronic%20Measurements%20and%20Sensors.htm">http://users.utcluj.ro/~tarnovan/Electronic%20Measurements%20and%20Sensors.htm</a>			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Analog and Digital Measurement Devices	2	Exposure applications	Experimental circuits, Computer LabView software, NI hardware
Domain Extension of Analog Measurement Instruments	2		
Single-phased A.C. Circuits Measurements	2		
The Wheatstone Bridge	2		
The Oscilloscope. Basics and Measuring Principles	2		
Virtual Instrumentation: LabView - Basic Operations	2		
Virtual Instrumentation applications	2		
Data Acquisition Systems: Single Sample Acquisition Mode	2		
Data Acquisition Systems. Signal Processing Applications	2		
Temperature Measurement	2		
Level and Flow Measurement	2		
Displacement Measurement	2		
Angular Speed Measurement	2		
Final Assessment of Laboratory Reports	2		
Bibliography			
1. Rodica Holonec, B. Tebrean, I.G. Tarnovan, Gh. Todoran, Electronic Measurements: Laboratory Manual Editura U.T. PRESS, Cluj-Napoca 2010, ISBN.978-973-662-600			
2. Munteanu, R., Dragomir, N.D., TÂRNOVAN, I.G., Holonec, Rodica, Bortoş, P. – Tehnici de măsurare. Îndrumător de laborator. Atelierul de multiplicare al U.T.C.-N., 1995.			

\*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

The acquired skills will be required of employees who work in designing or testing of sensors and instrumentation systems.

### 10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Final exam (E)-Theoretical questions and exercises (3 hours)	Written examination	80%

Seminar			
Laboratory	Practical circuit (P)	Checking of functionality	10%
	Homework (HW)	Verification of results	10%
Project			
Minimum standard of performance: $G=(E+P+HW)/100$ ; Condition to take the credits: $G \geq 5$ ;			

Course responsible  
 Assoc.Prof. Rodica Holonec, PhD eng

Head of department  
 Prof. Rodica Potolea, PhD eng

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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	16.

### 2. Data about the subject

2.1 Subject name		<b>Fundamental Algorithms</b>			
2.2 Course responsible/lecturer		Prof. dr. eng. Rodica Potolea – <a href="mailto:Rodica.Potolea@cs.utcluj.ro">Rodica.Potolea@cs.utcluj.ro</a>			
2.3 Teachers in charge of seminars/ laboratory/ project		Assoc.prof.dr.eng. Camelia Lemnaru – <a href="mailto:Camelia.Lemnaru@cs.utcluj.ro">Camelia.Lemnaru@cs.utcluj.ro</a>			
2.4 Year of study	II	2.5 Semester	1	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			DD
		DI – Impusă, DOp – opțională, DFac – facultativă			DI

### 3. Estimated total time

3.1 Number of hours per week	5	of which:	Course	2	Seminars	1	Laboratory	2	Project	
3.2 Number of hours per semester	70	of which:	Course	28	Seminars	14	Laboratory	28	Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										21
(b) Supplementary study in the library, online and in the field										26
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										16
(d) Tutoring										8
(e) Exams and tests										9
(f) Other activities:										
3.4 Total hours of individual study (suma (3.3(a)...3.3(f)))					80					
3.5 Total hours per semester (3.2+3.4)					150					
3.6 Number of credit points					6					

### 4. Pre-requisites (where appropriate)

4.1 Curriculum	Imperative programming languages (C și / sau Java) Data Structures and Algorithms
4.3 Competence	Acquire the abilities of designing, implementing, testing and evaluating programs to solve specific problems

### 5. Requirements (where appropriate)

5.1. For the course	Whiteboard, projector, computer
5.2. For the applications	Computers/Network of computers, C ++

### 6. Specific competence

6.1 Professional competences	<p><b>C3.</b> Problems solving using specific Computer Science and Computer Engineering tools (5 credit points)</p> <p><b>C3.1-</b> Identifying classes of problems and solving methods that are specific to computing systems</p> <p><b>C3.2</b> - Using interdisciplinary knowledge, solution patterns and tools, making experiments and interpreting their results</p>
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	<p><b>C3.3</b> - Applying solution patterns using specific engineering tools and methods</p> <p><b>C3.4</b> - Evaluating, comparatively and experimentally, the available alternative solutions for performance optimization</p> <p><b>C3.5</b> - Developing and implementing informatic solutions for concrete problems</p> <p><b>C4.</b> Improving performances of hardware, software and communication systems</p> <p><b>C4.1</b> - Identifying and describing the defining performance elements of hardware, software and communication systems</p> <p><b>C4.2</b> - Explaining the interaction of the factors that determine the performances of hardware, software and communication systems</p> <p><b>C4.3</b> - Applying fundamental methods and principles for increasing performance of hardware, software and communication systems</p> <p><b>C4.4</b> - Choosing criteria and methods for performance evaluation of hardware, software and communication systems</p> <p><b>C4.5</b> - Developing performance based professional solutions for hardware, software and communication systems</p>
6.2 Cross competences	N/A

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

7.1 General objective	<ul style="list-style-type: none"> <li>Acquiring modern study of algorithms: design and analysis</li> </ul>
7.2 Specific objectives	<ul style="list-style-type: none"> <li>Learn to identify and design efficient solutions to problems</li> <li>Learn methods to evaluate efficiency</li> <li>Learn the basic polynomial algorithms</li> <li>Learn basic computational complexity</li> <li>Algorithms description with focus on control structures</li> <li>Learning the correct implementation following the pseudocode</li> <li>Efficient implementation of key polynomial algorithms</li> <li>Estimation of algorithms' efficiency: space and processing time</li> </ul>

### 8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Mathematical Foundations: Asymptotical notation, Recurrence	2	Whiteboard, projector, computer; Lectures, discussions, Q&A sessions	
Complexity Classes	2		
Sorting and Order Statistics	2		
Sorting and Order Statistics (continued)	2		
Advanced Data Structures : Hash Tables, Trees	2		
Advanced Data Structures: Heaps, Disjoint Sets	2		
Design and Analysis Advanced Techniques: Dynamic Programming	2		
Design and Analysis Advanced Techniques: Greedy Algorithms	2		
Design and Analysis Advanced Techniques: Damping Analyze	2		
Graphs: Search in a Graph, Minimal Spanning Tree	2		
Graphs: Shortest path	2		
Graphs: Max Flow	2		
Graphs: Bipartite Graphs	2		
Learn the basic Complexity sets and representative problems	2		
Bibliography			
1. T. Cormen, C. Rleiserson, R. Rivest, C. Stein, <i>Introduction to Algorithms, Second Edition</i> , The MIT Press, 2001			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Efficient implementation and comparison of sorting algorithms		Hands on work on specific algorithms; weekly assessment, feedback, and assistance	
Efficient implementation and comparison of sorting algorithms (continued)			
Efficient implementation and comparison of lists algorithms			
Efficient implementation and comparison of lists algorithms (continued)			
Efficient implementation and comparison of trees algorithms			
Efficient implementation and comparison of trees algorithms			

(continued)			
Implementation of augmented data structures			
Implementation of augmented data structures (continued)			
Efficient implementation of graphs algorithms			
Efficient implementation of graphs algorithms (continued)			
Efficient implementation of graphs algorithms (continued)			
Efficient implementation of graphs algorithms (continued)			
Approximation algorithms			
Final Evaluation			
Bibliography			
1. T. Cormen, C. Rleiserson, R. Rivest, C. Stein, <i>Introduction to Algorithms, Second Edition</i> , The MIT Press, 2001			

*\*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**

The topic is fundamental in the field of Computer and Information Technology, its content is beyond dispute, familiarizing students with the principles of algorithms design and analysis. The content is similar (including the textbook) with all representative computer science departments in the world, is a core course in the ACM curricula and was rated by the Romanian governmental agencies (CNEAA and ARACIS).

**10. Evaluation**

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Theoretical analysis and problem solving skills	Written exam	70% (20% MT + 50% FE)
Seminar	Hands on Problem solving skills	Implementation/ hands on	30% (Lab)
Laboratory			
Project			
Minimum standard of performance: Grade calculus: 20% midterm + 30% laboratory + 50% final exam Conditions for participating in the final exam: Laboratory $\geq 5$ Conditions for promotion: final exam $\geq 5$			

Course responsible  
Prof.dr.eng. Rodica Potolea

Head of department  
Prof.dr.eng. Rodica Potolea

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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	17.

### 2. Data about the subject

2.1 Subject name	<b>Analog and digital circuits</b>				
2.2 Course responsible/lecturer	Prof. dr. eng. Dădârlat Vasile Teodor – <a href="mailto:Vasile.Dadarlat@cs.utcluj.ro">Vasile.Dadarlat@cs.utcluj.ro</a>				
2.3 Teachers in charge of seminars/ laboratory/ project	Conf. dr. eng. Peculea Adrian – <a href="mailto:Adrian.Peculea@cs.utcluj.ro">Adrian.Peculea@cs.utcluj.ro</a> Sl. dr. eng. Iancu Bogdan – <a href="mailto:Bogdan.Iancu@cs.utcluj.ro">Bogdan.Iancu@cs.utcluj.ro</a>				
2.4 Year of study	II	2.5 Semester	1	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	<i>DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară</i>				DD
	<i>DI – Impusă, DOp – opțională, DFac – facultativă</i>				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									12	
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays									14	
(d) Tutoring									2	
(e) Exams and tests									6	
(f) Other activities:									0	
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	
4.4 Competence	Basic knowledge in Physics, Electronics, Mathematics

### 5. Requirements (where appropriate)

5.1. For the course	Multimedia means
5.2. For the applications	Classroom, PC with internet access

### 6. Specific competence

6.1 Professional competences	<b>C2:</b> Designing hardware, software and communication components <b>C2.1:</b> Describing the structure and functioning of computational, communication and software components and systems <b>C2.2:</b> Explaining the role, interaction and functioning of hardware, software and
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	<p>communication components</p> <p><b>C2.3:</b> Building the hardware and software components of some computing systems using algorithms, design methods, protocols, languages, data structures, and technologies</p> <p><b>C2.4:</b> Evaluating the functional and non-functional characteristics of the computing systems using specific metrics</p> <p><b>C2.5:</b> Implementing hardware, software and communication systems</p>
6.2 Cross competences	N/A

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

7.1 General objective	Teamwork, understanding of basic digital electronics principles
7.2 Specific objectives	Each student able to understand the functionality for the main circuits from a motherboard

### 8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Introduction. Electrical signals, passive devices, linear circuits behavior at elementary signals application.	2	Oral Presentations using multimedia means Q & A Interactive teaching	
Semiconductor devices (I). Semiconductor, Schottky, Zener and light emitting diode.	2		
Semiconductor devices (II). Bipolar and field effect transistor.	2		
Operational amplifiers. Characteristics, circuits with operational amplifiers with negative feedback.	2		
DC power supplies. Rectifiers, filters. Parametric, feedback and integrated voltage regulators. Oscillators. Positive feedback, oscillator circuits.	2		
Integrated logic circuit parameters. Static transfer characteristics, noise margins, fan-in and fan-out, propagation time, power dissipation.	2		
Integrated logic circuit families (I). TTL integrated logic circuits.	2		
Integrated logic circuit families (II). NMOS, CMOS and HCT integrated logic circuits.	2		
Bus building with logic circuits. Open collector and three state integrated logic circuits, connecting circuits to buses, transfer between registers and three state logic.	2		
Positive feedback circuits (I). Schmitt trigger and flip-flop circuits.	2		
Positive feedback circuits (II). Monostable and astable circuits.	2		
Semiconductor memories. Volatile and non-volatile semiconductor memories.	2		
Converters. Sampling, signal quantization, analog to digital and digital to analog converters.	2		
Microcontrollers. Architecture, memory addressing, interrupt and timer system, serial communication.	2		
Bibliography			
1. Vasile Teodor Dadarlat, Adrian Peculea, „Circuite analogice si numerice”, Ed. U.T.PRES, Cluj-Napoca, 2006, ISBN (10) 973-662-243-6 ISBN (13) 978-973-662-243-4.			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Electrical signals and liner circuits.	2	Practical exercises Brief presentation of possible solutions Self testing programmes	
Semiconductor, Schottky, Zener and light emitting diode.	2		
Bipolar and field effect transistor.	2		
Circuits with passive and semiconductor devices.	2		
Circuits with operational amplifiers with negative feedback.	2		
Rectifiers, filters and regulators.	2		
Oscillator circuits.	2		

Bipolar integrated logic circuits.	2		
MOS integrated logic circuits.	2		
Open collector integrated logic circuits.	2		
Three state integrated logic circuits.	2		
Schmitt trigger circuits.	2		
Multivibrator circuits.	2		
Laboratory test	2		
Bibliography			
1. Slides for Analog and digital circuits courses + sets of problems and applications for individual study at <a href="ftp://ftp.utcluj.ro/pub/users/dadarlat/circ_analognumeric-calc">ftp://ftp.utcluj.ro/pub/users/dadarlat/circ_analognumeric-calc</a>			

*\*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

Course content is kept state of the art by using latest technologies and devices available on the market

### 10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Interactivity and initial preparation, intermediary and final written examinations	Written exam (2,5 h).	70%
Seminar			
Laboratory	Quality of practical work, participation	Continuous assessment, final written colloquium	30%
Project			
Minimum standard of performance: Grade calculus: 30% laboratory + 70% final exam Conditions for participating in the final exam: Laboratory $\geq 5$ Conditions for promotion: grade $\geq 5$			

Course responsible  
Prof. dr. eng. Vasile Dădârlat

Head of department  
Prof.dr.eng. Rodica Potolea

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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	18.

### 2. Data about the subject

2.1 Subject name		<b>Object Oriented Programming</b>			
2.2 Course responsible/lecturer		S.I. dr. eng. Marius Joldoș – <a href="mailto:Marius.Joldos@cs.utcluj.ro">Marius.Joldos@cs.utcluj.ro</a>			
2.3 Teachers in charge of seminars/ laboratory/ project		Eng. Giuroiu Titus-Nicolae, MS – <a href="mailto:titus.giuroiu@gmail.com">titus.giuroiu@gmail.com</a> Eng. Bondor Alexandru Viorel – <a href="mailto:alexandru.viorel.bondor@gmail.com">alexandru.viorel.bondor@gmail.com</a>			
2.4 Year of study	II	2.5 Semester	1	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	<i>DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară</i>				DD
	<i>DI – Impusă, DOp – opțională, DFac – facultativă</i>				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									25	
(b) Supplementary study in the library, online and in the field									17	
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays									16	
(d) Tutoring									6	
(e) Exams and tests									5	
(f) Other activities:									0	
3.4 Total hours of individual study (suma (3.3(a)...3.3(f)))							69			
3.5 Total hours per semester (3.2+3.4)							125			
3.6 Number of credit points							5			

### 4. Pre-requisites (where appropriate)

4.1 Curriculum	Computer Programming course
4.5 Competence	Use of a procedural programming language such as C

### 5. Requirements (where appropriate)

5.1. For the course	
5.2. For the applications	

### 6. Specific competence

6.1 Professional competences	<b>C2</b> – Designing hardware, software and communication components (5 credits) <b>C2.1</b> – Describing the structure and functioning of computational, communication and software components and systems <b>C2.2</b> – Explaining the role, interaction and functioning of hardware, software and communication components
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	<p><b>C2.3</b> – Building the hardware and software components of some computing systems using algorithms, design methods, protocols, languages, data structures, and technologies</p> <p><b>C2.4</b> - Metric based evaluation of functional and non-functional characteristics of computing systems</p> <p><b>C2.5</b> - Implementation of hardware, software and communication components</p>
6.2 Cross competences	N/A

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

7.1 General objective	To learn a rigorous treatment of object-oriented concepts using Java as an example language
7.2 Specific objectives	<ul style="list-style-type: none"> <li>• to prepare object-oriented design for small/medium scale problems</li> <li>• to demonstrate the differences between traditional imperative design and object-oriented design</li> <li>• to explain class structures as fundamental, modular building blocks</li> <li>• to understand the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code</li> <li>• to write small/medium scale Java programs with simple graphical user interface</li> <li>• to use classes written by other programmers when constructing their systems</li> <li>• to be able to design and build simple Graphical User Interfaces (GUI)s.</li> </ul>

### 8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Concepts and paradigms in OOP. On to Java	2	Lectures, demos and discussions	Uses a video-projector
Control structures in Java.	2		
Classes and Objects. Arrays	2		
Packages. Inheritance and polymorphism.	2		
Java Interfaces. OO Application Development	2		
UML Object and Class Diagrams. Assertions.	2		
Testing. Debugging. Java Errors and Exceptions	2		
Java Collections. Generic Programming.	2		
Introduction to Java I/O	2		
Event handling in Java. Introduction to Java Graphics	2		
Graphical User Interfaces (I)	2		
Introduction to Threads	2		
Graphical User Interfaces (II)	2		
Review	2		
Bibliography			
1. Bruce Eckel, Thinking in Java, Third Edition, Prentice Hall PTR, 2002 (downloadable for free from the Web).			
2. Paul & Harvey Deitel, Java. How to Program (Early Objects), Tenth Edition, Prentice Hall, 2015			
3. David J. Barnes & Michael Kölling, Objects First with Java. A Practical Introduction using BlueJ, Fifth Edition, Prentice Hall / Pearson Education, 2012			
4. Oracle Java Tutorials (freely downloadable from the Web)			
5. Schmuller Joseph, SAMS teach yourself UML in 24 hours, 2004			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Using BlueJ IDE	2	Tutoring, discussions, and assisted program development	PCs equipped with Java SDK and IDEs (BlueJ, Eclipse, Netbeans)
Primitive Types and Simple IO in Java	2		
Variables and Expressions in Java	2		
Flow Control and Simple Classes in Java	2		
Classes, Objects and Arrays	2		
Java Inheritance	2		
Java Interfaces	2		
<b>Laboratory test 1</b>	2		

Java Exception Handling.	2		
Collections	2		
Testing OOP programs	2		
GUIs. Event Handling	2		
GUIs. Keyboard and Mouse Handling	2		
<b>Laboratory test 2</b>	2		
Bibliography			
1. Course Moodle site available at: <a href="https://labacal.utcluj.ro">https://labacal.utcluj.ro</a>			

*\*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**

The contents of the course is in accordance with the ACM Computer Science Curricula recommendations  
Java programming language is the most widely used language.

**10. Evaluation**

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Ability to solve problems using the object orientated paradigm	Written exams: In-class tests Final	10% 50%
Seminar			
Laboratory	Quality of laboratory applications and evaluation of the laboratory tests	Specifications and code analysis and evaluation	40%
Project			
Minimum standard of performance: Grade calculus: 10% midterm + 40% laboratory + 50% final exam Conditions for participating in the final exam: Laboratory $\geq 5$ Conditions for promotion: grade $\geq 5$			

Course responsible  
S.l. dr. eng. Marius Joldoș

Head of department  
Prof.dr.eng. Rodica Potolea

## 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	<b>Computer Science and Information Technology</b>
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	19.

### 2. Data about the subject

2.1 Subject name		<b>DataBase</b>			
2.2 Course responsible/lecturer		S.I. dr. eng. Călin Cenan – <a href="mailto:Calin.Cenan@cs.utcluj.ro">Calin.Cenan@cs.utcluj.ro</a>			
2.3 Teachers in charge of seminars/ laboratory/ project		Conf. dr. eng. Delia Mitrea – <a href="mailto:Delia.Mitrea@cs.utcluj.ro">Delia.Mitrea@cs.utcluj.ro</a>			
2.4 Year of study	II	2.5 Semester	1	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	<i>DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară</i>				DD
	<i>DI – Impusă, DOp – opțională, DFac – facultativă</i>				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									11	
(b) Supplementary study in the library, online and in the field									18	
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays									11	
(d) Tutoring									1	
(e) Exams and tests									3	
(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	Mathematics
4.6 Competence	Set theory

### 5. Requirements (where appropriate)

5.1. For the course	Board, video projector, computer; student present in mandatory 50% of days for admission to the final exam
5.2. For the applications	Computers, specific software; student present in mandatory 100% of days for admission to the final exam

### 6. Specific competence

6.1 Professional competences	<p><b>C4</b> - Improving the performances of the hardware, software and communication systems</p> <p><b>C4.1</b> - Identifying and describing the defining elements of the performances of the hardware, software and communication systems</p> <p><b>C4.2</b> - Explaining the interaction of the factors that determine the performances of the hardware, software and communication systems</p> <p><b>C4.3</b> - Applying the fundamental methods and principles for increasing the performances of the hardware, software and communication systems</p> <p><b>C4.4</b> - Choosing the criteria and evaluation methods of the performances of the hardware, software and communication systems</p> <p><b>C4.5</b> - Developing professional solutions for hardware, software and communication systems based on performance optimization</p>
6.2 Cross competences	N/A

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

7.1 General objective	Developing general skills in databases and database applications
7.2 Specific objectives	Assimilate theoretical knowledge on relational databases, Structured Query Language SQL language Presentation of Database Management Systems DBMS Getting practical skills for designing and implementing database and development of database application

### 8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Introduction. Database, Database Management Systems	2	PDF & PPT Presentations; Demonstrations and model presentations on board; small exercises to increase interaction	
Database Management Systems Architecture	2		
Entity – Relation Model	2		
Relational Model	2		
Database Design; Optimization, Normal forms	2		
Entities; Relations; Constraints; Views (II)	2		
Physical database design	2		
Indexes	2		
Relational Algebra	2		
Relational Calculus	2		
Query by example	2		
Structured Query Language – SQL	2		
Database administration; Security	2		
Database Applications	2		
Bibliography			
1. Alexandru Leluțiu - <i>Perenitatea Concepteleor Promovate de BAZELE de DATE</i> , Ed. Albastra, 2003			
2. Raghu Ramakrishnan and Johannes Gehrke - <i>Database Management Systems</i> , McGraw-Hill Science, 2002			
3. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom - <i>First Course in Database Systems</i> , Prentice Hall, 2001			
4. P. O'Neil, E. O'Neil - <i>DATABASE Principles, Programming and Performance</i> , Academic Press Morgan Kaufmann, 1994			
5. Philip Greenspun - <i>SQL for Web Nerds</i> , <a href="http://philip.greenspun.com/sql/">http://philip.greenspun.com/sql/</a>			
6. Ryan K. Stephens, Ronald R. Plew, - <i>Teach Yourself SQL in 21 Days</i> , Prentice Hall, 1999			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Microsoft SQL Server presentation	2	Exposure and applications	Computers, MS SQL Server, MySQL, Apache Web Server, PHP
MS SQL Server administration	2		
MS SQL Server databases: Tables; Relationships; Database diagrams	2		
MS SQL Server databases: Indexes; Constraints; Views	2		
MS SQL Server databases: INSERT, UPDATE, DELETE	2		
Structured Query Language – SQL – Simple SELECT	2		
Structured Query Language – SQL – Advanced SELECT	2		
MySQL presentation; MySQL administration	2		
MySQL databases	2		

Examples of Web Database Applications	2		
Database design – simple examples	2		
Database design – more complex examples	2		
Project Work – Web Database Applications	2		
Final laboratory work evaluation	2		
Bibliography			
1. Raghu Ramakrishnan and Johannes Gehrke - <i>Database Management Systems</i> , McGraw-Hill Science, 2002			
2. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom - <i>First Course in Database Systems</i> , Prentice Hall, 2001			
3. Philip Greenspun - <i>SQL for Web Nerds</i> , <a href="http://philip.greenspun.com/sql/">http://philip.greenspun.com/sql/</a>			
4. Ryan K. Stephens, Ronald R. Plew, - <i>Teach Yourself SQL in 21 Days</i> , Prentice Hall, 1999			

\*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

Database is a topic of Computer Engineering and Information Technology field, combining fundamental aspects and practical software tools. Explaining to students the principles of database implementation, database design and implementing database application. Course content it is similar to database courses in other universities in the country and abroad.

### 10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Solving problems and answers to theoretical questions	2.5 hours written evaluation	60% (a grade greater than 5 is mandatory)
Seminar			
Laboratory	Presenting databases implemented in 2 different DBMS; Knowing Structured Query Language Project Work: Web Database Applications	Ongoing evaluation Final presentation	30% (a grade greater than 5 is mandatory) 10%
Project			

Minimum standard of performance:

Solving practical laboratory work, implementing a database and a database application, solving the SQL Structured Query Language problem and another two out of the four other subjects.

Grade calculus: 40% lab + 60% final exam

Conditions for participating in the final exam: Lab  $\geq$  5

Conditions for promotion: final exam  $\geq$  5

Course responsible  
S.l.dr.ing. Calin Cenan

Head of department  
Prof.dr.eng. Rodica Potolea



## 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	<b>Computer Science and Information Technology</b>
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	20.

### 2. Data about the subject

2.1 Subject name		<b>Special Mathematics in Engineering</b>			
2.2 Course responsible/lecturer		Prof.dr. Ioan Rasa <a href="mailto:Ioan.Rasa@math.utcluj.ro">Ioan.Rasa@math.utcluj.ro</a>			
2.3 Teachers in charge of seminars/ laboratory/ project		Assoc.prof.dr. Daniela Inoan - <a href="mailto:Daniela.Inoan@math.utcluj.ro">Daniela.Inoan@math.utcluj.ro</a>			
2.4 Year of study	II	2.5 Semester	1	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category		DF – fundamentală, DD – în domeniul, 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	2	Laboratory		Project	
3.2 Number of hours per semester	56	of which:	Course	28	Seminars	28	Laboratory		Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography									20	
(b) Supplementary study in the library, online and in the field									20	
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays									26	
(d) Tutoring										
(e) Exams and tests									3	
(f) Other activities:										
3.4 Total hours of individual study (suma (3.3(a)...3.3(f)))					69					
3.5 Total hours per semester (3.2+3.4)					125					
3.6 Number of credit points					5					

### 4. Pre-requisites (where appropriate)

4.1 Curriculum	Elementary knowledge of complex numbers. Elements of calculus.
4.7 Competence	Competences in using complex numbers (in algebraic and trigonometric form). Ability to calculate derivatives and real integrals.

### 5. Requirements (where appropriate)

5.1. For the course	Blackboard, videoprojector
5.2. For the applications	Blackboard, videoprojector

## 6. Specific competence

6.1 Professional competences	<p><b>C1</b> – Operating with basic Mathematical, Engineering and Computer Science concepts</p> <p><b>C1.1</b> - Recognizing and describing specific concepts to calculability, complexity, programming paradigms and modeling of computing and communication systems</p> <p><b>C1.2</b> - Using specific theories and tools (algorithms, schemes, models, protocols, etc.) for explaining the structure and the functioning of hardware, software and communication systems</p> <p><b>C1.3</b> - Building models for various components of computing systems</p> <p><b>C1.4</b> - Formal evaluation of the functional and non-functional characteristics of computing systems</p> <p><b>C1.5</b> - Providing theoretical background for the characteristics of the designed systems</p>
6.2 Cross competences	N/A

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

7.1 General objective	A presentation of the concepts, notions, methods and fundamental techniques used in complex functions theory and integral transforms theory.
7.2 Specific objectives	Use of the complex functions theory and integral transforms theory for solving problems in engineering.

## 8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Complex numbers. Operations, topology in C.	2	Explanation Demonstration Collaboration Interactive activities	
Continuity. Monogenic functions. The Cauchy-Riemann conditions. Holomorphic functions.	2		
The complex integral. Definition. Cauchy's integral theorem. Cauchy's integral formula.	2		
Taylor and Laurent series. Singular points, classification.	2		
Residues. The Residue Theorem.	2		
Applications of the Residue Theorem.	2		
Real integrals calculated with complex methods.	2		
The Fourier transform. Definition, properties.	2		
Applications of the Fourier transform.	2		
The Laplace transform. Definition and properties.	2		
The inverse Laplace transform.	2		
Applications of the Laplace transform.	2		
The z transform. Applications.	2		
Difference equations. The z transform applied to solving difference equations.	2		
Bibliography			
1. A.I. Mitrea, Analiza matematica in complex (curs+culegere de probleme), Ed. Mediamira, Cluj-Napoca, 2005.			
2. A.I. Mitrea, Transformari integrale si discrete (curs + culegere de probleme) Ed. Mediamira, Cluj-Napoca, 2004.			
3. M.L. Krasnov, A.I. Kiselev, G.I. Makarenko, Functions of a Complex Variable, Operational Calculus and Stability Theory, Mir Publishers, Moscow, 1984.			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Operations in C. Geometric interpretations.	2	Explanation	
The Cauchy-Riemann conditions. Holomorphic functions.	2		
Elementary functions, equations in the complex domain.	2	Demonstration	
The complex integral.	2		
Series of functions.	2	Collaboration	
Residues. The Residue Theorem.	2		
Computing real integrals by using the Residue Theorem.	2	Interactive activities	
The Fourier transform.	2		

Properties and applications of the Fourier transform	2		
The Laplace transform.	2		
The inverse Laplace transform.	2		
Applications of the Laplace transform.	2		
The z transform.	2		
Difference equations solved with the z transform.	2		
Bibliography			
1. A.I. Mitrea, Analiza matematica in complex (curs+culegere de probleme), Ed. Mediamira, Cluj-Napoca, 2005.			
2. A.I. Mitrea, Transformari integrale si discrete (curs + culegere de probleme) Ed. Mediamira, Cluj-Napoca, 2004.			
3. M.L. Krasnov, A.I. Kiselev, G.I. Makarenko, Functions of a Complex Variable, Operational Calculus and Stability Theory, Mir Publishers, Moscow, 1984.			

*\*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**

Collaboration with engineers in order to identify and solve problems raised by the market.
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**10. Evaluation**

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Abilities of understanding and using creatively the concepts and proofs	Written examination	30%
Seminar	Abilities of solving problems and applying algorithms	Written examination	70%
Laboratory			
Project			
Minimum standard of performance: Ability to present coherently a theoretical subject and to solve problems with practical content.			

Course responsible  
Prof.dr.Ioan Rasa

Head of department  
Prof.dr.eng. Rodica Potolea

## 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	<b>Computer Science and Information Technology</b>
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	21.

### 2. Data about the subject

2.1 Subject name		<b>Foreign Language I (English, French, German - Technical documents elaboration)</b>			
2.2 Course responsible/lecturer		Conf.univ.dr. Sonia Munteanu			
2.3 Teachers in charge of seminars/ laboratory/ project		-			
2.4 Year of study	II	2.5 Semester	1	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	C
2.7 Subject category		DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară			DC
		DI – Impusă, DOp – opțională, DFac – facultativă			DI

### 3. Estimated total time

3.1 Number of hours per week	2	of which:	Course	2	Seminars		Laboratory		Project	
3.2 Number of hours per semester	28	of which:	Course	28	Seminars		Laboratory		Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography									22	
(b) Supplementary study in the library, online and in the field										
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										
(d) Tutoring										
(e) Exams and tests										
(f) Other activities:										
3.4 Total hours of individual study (suma (3.3(a))...3.3(f))					22					
3.5 Total hours per semester (3.2+3.4)					50					
3.6 Number of credit points					2					

### 4. Pre-requisites (where appropriate)

4.1 Curriculum	Foreign language seminars I, II
4.8 Competence	English language competence, B2 level in CEFR

### 5. Requirements (where appropriate)

5.1. For the course	Study of research and journal articles
5.2. For the applications	-

### 6. Specific competence

6.1 Professional competences	N/A
6.2 Cross competences	<b>CT3</b> – Demonstrating the spirit of initiative and action for updating professional, economical and organizational culture knowledge (1 credit)

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

7.1 General objective	Development of integrated skills in an engineering professional context
7.2 Specific objectives	At the end of this course, students should be able to: - Master documenting strategies, information processing; writing according to discourse patterns in specific purposes contexts; - Use strategies for handling difficult written text on a variety of science and academic related topics; - Comprehend and produce discipline appropriate text and genre. - Use lexical and grammar structures at +B2 language competence levels, according to CEFR

### 8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Hierarchical structure of grammar. Natural language processing; morphology, syntax, discourse. Language knowledge in technology development for language processing and artificial intelligence.	2	lecture, problem-based learning, case-study, small group discussions and task solving, assignment discussion	
Student's research on NLP and AI topics which involve knowledge about language. Assignment discussion	2		
Word structure: inflected and derivate words. Derivation as a means of creating technical vocabulary.	2		
Phrases: noun headed phrases, verb headed phrases, adjective headed phrases, and preposition headed phrases.	2		
Simple and complex sentences. Frequently used phrase/sentence structures in technical texts: coordination and subordination in finite and non-finite clauses.	2		
Cohesion and coherence in discourse: syntactic parallelism, sentence rephrase, nominalization, lexical choice, emphasis.	2		
Structure of information in paragraphs: general-particular patterns, theme-rheme, hypothesis and validation.	2		
Mid term evaluation.	2		
The informative function of science discourse: information structure, impersonal expression, nominalized theme.	2		
Functional and rhetorical organization of written science discourse: genres (textbooks, journal articles and scientific posters).	2		
Research articles vs. review articles in professional journals. Content, rhetorical structure, communicative purpose.	2		
Formulaic language in science discourse: multifunctional lexical bundles. Interpersonal function of science discourse: hedges, boosters and author mention in science discourse.	2		
Disciplinary variation in science discourse: professional communities, discourse communities. Selecting from language resources according to disciplinary practices.	2		
Final test	2		
Bibliography			
<ol style="list-style-type: none"> <li>1. Munteanu, S.-C (2013) <i>Academic English for Science and Engineering</i>. Cluj-Napoca: Casa Cartii de Stiinta. ISBN 978-606-17-0398-2.</li> <li>2. Swales John M. &amp; Christine B. Feak (2001) <i>Academic Writing For Graduate Students - Essential Tasks And Skills</i>, Ann Arbor: The University Of Michigan Press.</li> <li>3. Hyland Ken (2006) <i>English For Academic Purposes - An Advanced Resource Book</i>, London: Routledge</li> </ol>			

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

*\*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

Mastering a foreign language will support students in a more flexible integration in the labour market, and have improved personal development. The introduction in the language for specific purposes and academic discourse will facilitate reading and writing more documents in the field

### 10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Assessment completion in due time; Ability to comprehend below and above sentence syntactic and morphologic structures specific to science discourse; to read from sources, to comprehend complex text (journal articles, textbooks); Ability to produce a conference poster based on a published research article	- Multiple choice quizzes - Case-study and practical application of knowledge: Conference poster	mid-term test = 50% students' posters = 40% classwork = 10% total = 100%
Seminar			
Laboratory			
Project			
Minimum standard of performance: Assignment completion, minimum 80% of the midterm evaluation, min 80% on accuracy of poster.			

Course responsible  
Assoc.prof.dr. Sonia Munteanu

Head of department  
Conf.univ.dr. Ruxanda Literat

## 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	<b>Computer Science and Information Technology</b>
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	104.

### 2. Data about the subject

2.1 Subject name		<b><i>Pedagogie II: Teoria și metodologia instruirii. Teoria și metodologia evaluării.</i></b>			
2.2 Course responsible/lecturer		Conf. univ. dr. Liana Tăușan			
2.3 Teachers in charge of seminars/ laboratory/ project		Conf. univ. dr. Liana Tăușan			
2.4 Year of study	II	2.5 Semester	1	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	<i>DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară</i>				DC
	<i>DI – Impusă, DOp – opțională, DFac – facultativă</i>				Dfac

### 3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminars	2	Laboratory		Project	
3.2 Number of hours per semester	56	of which:	Course	28	Seminars	28	Laboratory		Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography									20	
(b) Supplementary study in the library, online and in the field									20	
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays									25	
(d) Tutoring										
(e) Exams and tests									4	
(f) Other activities:										
3.4 Total hours of individual study (suma (3.3(a))...3.3(f))					69					
3.5 Total hours per semester (3.2+3.4)					125					
3.6 Number of credit points					5					

### 4. Pre-requisites (where appropriate)

4.1 Curriculum	<ul style="list-style-type: none"> <li>• Psihologia educației</li> <li>• Pedagogie I</li> </ul>
4.9 Competence	<ul style="list-style-type: none"> <li>• Competențe formate ca urmare a studierii disciplinelor Psihologia educației, Pedagogie I</li> </ul>

### 5. Requirements (where appropriate)

5.1. For the course	<ul style="list-style-type: none"> <li>• Participare activă</li> </ul>
5.2. For the applications	<ul style="list-style-type: none"> <li>• Lectura bibliografiei recomandate</li> <li>• Documentare suplimentară</li> </ul>

	<ul style="list-style-type: none"> <li>• Elaborarea și susținerea prezentărilor planificate</li> <li>• Participare activă</li> </ul>
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## 6. Specific competence

6.1 Professional competences	<p>C1: Proiectarea unor programe de instruire sau educaționale adaptate pentru diverse niveluri de vârstă/pregătire și diverse grupuri țintă;</p> <p>C2: Realizarea activităților specifice procesului instructiv-educativ din învățământul gimnazial;</p> <p>C3: Evaluarea proceselor de învățare, a rezultatelor și a progresului înregistrat de elevi;</p> <p>C6: Autoevaluarea și ameliorarea continuă a practicilor profesionale și a evoluției în carieră;</p> <p>C7: Utilizarea metodelor de cercetare științifică și prelucrare a datelor în domeniul educației;</p> <p>C8: Aplicarea caracteristicilor învățământului centrat pe elev în proiectarea, implementarea și evaluarea curriculum-ului școlar;</p>
6.2 Cross competences	<p>CT1 Aplicarea principiilor și a normelor de deontologie profesională, fundamentate pe opțiuni valorice explicite, specifice specialistului în științele educației</p> <p>CT2 Cooperarea eficientă în echipe de lucru profesionale, interdisciplinare, specifice desfășurării proiectelor și programelor din domeniul științelor educației</p> <p>CT3 Utilizarea metodelor și tehnicilor eficiente de învățare pe tot parcursul vieții, în vederea formării și dezvoltării profesionale continue</p> <p>CT4: Promovarea valorilor asociate realizării unui învățământ de calitate, în conformitate cu politicile educaționale interne și în acord cu cele elaborate și popularizate la nivel european, pe baza cunoașterii specificității domeniului educațional european și a interculturalității</p>

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

7.1 General objective	<ul style="list-style-type: none"> <li>• dobândirea unor competențe vizând cunoașterea, interpretarea, prelucrarea și aplicarea problematicii teoriei și metodologiei instruirii și a teoriei și metodologiei evaluării, a modalităților de organizare a activității școlare pe principiul calității și valorificării eficiente a resurselor;</li> </ul>
7.2 Specific objectives	<ul style="list-style-type: none"> <li>• cunoașterea semnificației principalelor concepte din cadrul teoriei și metodologiei instruirii și a teoriei și metodologiei evaluării; dezvoltarea capacităților de utilizare a conceptelor;</li> <li>• identificarea corectă a referințelor empirice ale conceptelor pedagogice și semnificațiilor conceptuale ale proceselor de predare-învățare-evaluare;</li> <li>• utilizarea corectă și în contexte variate a terminologiei specifice teoriei și metodologiei instruirii și teoriei și metodologiei evaluării;</li> <li>• analizarea modalităților de abordare a procesului de învățământ;</li> <li>• identificarea unor modalități de articulare și integrare a metodelor și strategiilor de instruire în procesul de învățământ;</li> <li>• identificarea unor oportunități noi de abordare a metodelor și procedeele educaționale din perspectiva elaborării strategiilor de instruire;</li> <li>• operarea cu conceptele, structurile și tipologiile implicate în activitatea de evaluare școlară;</li> <li>• propunerea unor metode și procedee de evaluare corectă, obiectivă și semnificativă a performanțelor școlare ale elevilor;</li> <li>• elaborarea unor proiecte educaționale, bazate pe strategii didactice coerente, care facilitează stilurile individuale de învățare și modurile de organizare a procesului de învățământ;</li> <li>• elaborarea unor modele de proiectare prin aplicarea normativității în activitățile didactice;</li> </ul>



- dezvoltarea motivației pozitive și a unei atitudini favorabile față de profesia didactică, a receptivității și responsabilității față de schimbările inovatoare din domeniul didacticii generale;

## 8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
<b>DIDACTICA – TEORIE GENERALĂ A PROCESULUI DE ÎNVĂȚĂMÂNT</b> Paradigme și orientări educaționale actuale Didactica – definire, caracteristici, funcții Obiectul de studiu al didacticii Subramurile didacticii Direcții de dezvoltare a didacticii contemporane	2	Prelegere, Conversație, Dezbateri, Suporturi video	
<b>PROCESUL DE ÎNVĂȚĂMÂNT. ABORDAREA SISTEMICĂ</b> Definirea conceptelor: sistem de învățământ, proces de învățământ Note definitorii ale procesului de învățământ Abordarea sistemică a procesului de învățământ	2	Prelegere, Conversație, Dezbateri, Suporturi video	
<b>PROCESUL DE ÎNVĂȚĂMÂNT – CA ACT DE COMUNICARE</b> Comunicarea – concept, structură Forme ale comunicării Comunicarea didactică Definiție și caracteristici ale comunicării didactice Elemente structurale ale comunicării didactice Surse de distorsiune în comunicarea didactică. Eficientizarea comunicării didactice	2	Prelegere, Conversație, Dezbateri, Suporturi video	
<b>ABORDAREA INTERACȚIONALĂ A PROCESULUI DE ÎNVĂȚĂMÂNT</b> Predarea – componentă esențială a procesului de învățământ (conceptul de predare: semnificații tradiționale și moderne; forme ale predării; stiluri de predare) Învățarea (conceptele de învățare și învățare școlară; stiluri de învățare)	2	Prelegere, Conversație, Dezbateri, Suporturi video	
<b>SISTEMUL PRINCIPIILOR DIDACTICE</b> Principiile didactice: concept, caracteristici Sistemul principiilor didactice Principiul legării teoriei cu practica Principiul accesibilității (al respectării particularităților de vârstă și individuale) Principiul intuiției (al corelației dintre concret și abstract, dintre senzorial și rațional) Principiul sistematizării și continuității în învățare Principiul participării conștiente și active a elevilor Principiul însușirii temeinice	2	Prelegere, Conversație, Dezbateri, Suporturi video	
<b>METODOLOGIA DIDACTICĂ</b> Delimitări conceptuale: tehnologie didactică, metodologie didactică, strategie didactică, metodă de învățământ, procedeu didactic Tendințe actuale privind metodologia didactică Metodele de învățământ Metode de comunicare și dobândire a valorilor socioculturale Metode de explorare sistematică a realității obiective Metode fundamentate pe acțiune practică Metode de raționalizare a conținuturilor și operațiilor de predare/ învățare	6	Prelegere, Conversație, Dezbateri, Suporturi video	
<b>MIJLOACELE DE ÎNVĂȚĂMÂNT</b> Conceptul de mijloace de învățământ Funcțiile mijloacelor de învățământ Taxonomia mijloacelor de învățământ; Cerințe de selectare și utilizare a mijloacelor de învățământ.	2	Prelegere, Conversație, Dezbateri, Suporturi video	
<b>LECȚIA – FORMĂ DE BAZĂ A ORGANIZĂRII PROCESULUI DE</b>	2	Prelegere,	

<b>ÎNVĂȚĂMÂNT</b> Varietatea formelor de organizare a procesului de învățământ: concept, evoluție, clasificare Lecția – formă fundamentală a organizării procesului de învățământ Definirea lecției Valențe și critici ale lecției Variabile și cerințe pedagogice ale lecției Tipuri fundamentale de lecții		Conversație, Dezbateri, Suporturi video	
<b>EVALUAREA ÎN PROCESUL DE ÎNVĂȚĂMÂNT</b> Definirea și analiza conceptelor: evaluare, măsurare, apreciere. Funcțiile evaluării Forme de evaluare a rezultatelor și progreselor școlare: evaluarea inițială evaluarea finală ( sumativă) evaluarea formativă ( continuă ) Metode și tehnici de evaluare a rezultatelor și progreselor școlare Erori în evaluarea școlară. Modalități de corectare.	4	Prelegere, Conversație, Dezbateri, Suporturi video	
<b>PROIECTAREA DIDACTICĂ</b> Proiectarea didactică: concept, caracteristici. Modelul tradițional/modelul curricular al proiectării Etapile proiectării pedagogice Condițiile unei proiectări pedagogice eficiente Demersurile proiectării didactice la nivel micro Lectura personalizată a programei și a manualelor școlare Planificarea calendaristică Proiectarea secvențială a unităților de învățare Proiectarea lecțiilor/ activităților didactice	4	Prelegere, Conversație, Dezbateri, Suporturi video	
Bibliography			
<b>8.2 Applications – Seminars/Laboratory/Project</b>	<b>Hours</b>	<b>Teaching methods</b>	<b>Notes</b>
Didactica tradițională /didactica modernă. Centrarea pe elev – obiectiv al didacticii moderne.	2	Prezentări, dezbateri, studii de caz	
Abordarea sistemică a procesului de învățământ: componentele procesului de învățământ și relațiile dintre ele.	2	Prezentări, dezbateri, studii de caz	
Comunicarea didactică: elemente structurale, retroacțiuni, surse de distorsiuni, modalități de eficientizare a comunicării didactice.	2	Prezentări, dezbateri, studii de caz	
Interacțiunea proceselor de predare-învățare-evaluare. Condițiile predării eficiente. Condițiile învățării.	2	Prezentări, dezbateri, studii de caz	
Moduri concrete de aplicare a principiilor didactice pe diverse situații de instruire.	2	Prezentări, dezbateri, studii de caz	
Metode de comunicare, metode de explorare a realității, metode bazate pe acțiune practică, metode de raționalizare a conținuturilor – caracteristici, avantaje, limite, exemplificări	4	Prezentări, dezbateri, studii de caz	
Metode interactive, metode de dezvoltare a gândirii critice – caracteristici, exemplificări	4	Prezentări, dezbateri, studii de caz	
Cerințe pedagogice impuse de desfășurarea unei lecții eficiente. Modalități de modernizare a lecției.	2	Prezentări, dezbateri, studii de caz	
Testul docimologic – cerințe, exemplificări	2	Prezentări, dezbateri, studii de caz	
Modalități practice de atenuare a erorilor în evaluare.	2	Prezentări, dezbateri, studii de caz	
Condiții ale unei proiectări didactice eficiente. Exerciții de proiectare didactică: planificare calendaristică, proiectarea unității de învățare, proiectarea lecției.	2	Prezentări, dezbateri, studii de caz	
Evaluare portofoliu seminar	2	Evaluare prin portofoliu	

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\*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

## 10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Volumul și corectitudinea cunoștințelor	Evaluare orală	40
	Rigoarea științifică a limbajului	Evaluare orală	10
	Organizarea conținutului	Evaluare orală	10
	Originalitatea	Evaluare orală	10
Seminar	Susținerea unui referat	Fișă de evaluare seminar	20
	Participare activă la seminariile	Fișă de evaluare seminar	10

Laboratory			
Project			
Minimum standard of performance: 50% rezultat după însumarea punctajelor ponderate			

Course responsible  
Conf. univ. dr. Liana Tăușan

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