SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Automation and Computer Science
1.3	Department	Mathematics
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	1.

2. Data about the subject

2.1	Subject name					Mathematical Analysis I (Differential calculus)					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Prof. dr. Dumitru Mircea IVAN					
2.4	Teachers in charge of applications					Lect. Mircea RUS, Lect. Adela CAPATA					
2.5	Year of study	I	2.6	Semester	1	2.7	Assessment	exam	2.8	Subject category	DF/OB

3. Estimated total time

Sem.	Subject name	Lecture	Applications			Lecture	Applications			Individual study	TOTAL	Credit
		[hours / week.]				[hours / semester]						
			S	L	P		S	L	P			
1	**Mathematical Analysis I (Differential calculus)**	**2**	**2**	**-**	**-**	**28**	**28**	**-**	**-**	**48**	**104**	**4**

3.1	Number of hours per week	4	3.2	of which, course	2	3.3	applications	2
3.4	Total hours in the teaching plan	56	3.5	of which, course	28	3.6	applications	28

Individual study	Hours
Manual, lecture material and notes, bibliography	20
Supplementary study in the library, online and in the field	4
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	21
Tutoring	0
Exams and tests	3
Other activities	0

3.7	Total hours of individual study	48
3.8	Total hours per semester	104
3.9	Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	Basic knowledge of Differential Calculus and Set Theory
4.2	Competence	Competences in elementary Differential Calculus: elements of set theory, limits, sequences and series, derivatives.

5. Requirements (where appropriate)

5.1	For the course	Videoprojector
5.2	For the applications	Videoprojector

6. Specific competences

Professional competences	**C1 –** Operating with basic Mathematical, Engineering and Computer Science concepts **C1.1 –** Recognizing and describing concepts that are specific to the fields of calculability, complexity, programming paradigms, and modeling computational and communication systems **C1.3 –** Building models for various components of computing systems **C1.5 –** Providing a theoretical background for the characteristics of the designed systems
Cross competences	N/A

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

7.1	General objective	A presentation of the concepts, notions, methods and fundamental techniques used in differential calculus.
7.2	Specific objectives	Use of the differential calculus in order to solve problems in engineering. Use of the differential calculus in modelling and solving practical problems concerning spatial forms.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Elements of Set Theory. Set operations. Functions. Cardinal numbers.	Explanation Demonstration Collaboration Interactive activities	
2	General Topology. Topologies and topological spaces. Open and closed sets. Neighbourhoods. Interior and closure of a set. Limit points.		
3	Metric. Topology of a metric space. Sequences in metric spaces.		
4	Sequences of Numbers. Stolz-Cesaro criterion.		
5	Series of Numbers. Convergence tests for series. Infinite products.		
6	Continuity. Continuous mappings on topological, metric and Euclidean spaces.		
7	Differential Calculus for Functions of One Variable. Mean-value theorems. Taylor's formula for real functions of one variable. Differential of functions of one variable.		
8-10	Differential Calculus for Functions of Several Variables. Partial derivatives. Derivative of composite functions. Homogeneous functions. Euler's identity. Gradient. Directional derivative. Lagrange's mean value theorem. Differential of functions of several variables. Taylor's formula for functions of several variables.		
11-12	Functional Sequences and Series. Power series. Trigonometric and Fourier series.		
13	Implicit Functions. Existence theorems for implicit functions. Change of coordinates and variables.		
14	Extrema of Functions. Unconditional and conditional extrema.		

Bibliography

1. Mircea Ivan. Elemente de calcul integral. Mediamira, Cluj-Napoca, 2003.
2. Dumitru Mircea Ivan. Calculus. Editura Mediamira, Cluj-Napoca, 2002.

8.2. Applications (Seminars)		Teaching methods	Notes
1	Exercises related to: set operations, functions, cardinal numbers.	Explanation Demonstration Collaboration Interactive	
2	Exercises related to: topologies, open and closed sets, eighbourhoods, interior and closure of a set.		
3	Example of metrics with application in engineering.		
4	Exercises related to sequences of numbers.		
5	Exercises concerning convergence tests for series.		
6	Exercises related to continuous mappings.		

7	Exercises concerning mean-value theorems and Taylor's formula for real functions of one variable.	activities	
8-10	Exercises related to: partial derivatives, derivative of composite functions, gradient, directional derivative, differential of functions of several variables, Taylor's formula for functions of several variables.		
11-12	Exercises related to power and Fourier series.		
13	Exercises related to implicit functions, change of coordinates and variables.		
14	Exercises concerning unconditional and conditional extrema.		

Bibliography

1. Dumitru Mircea Ivan, et al. Analiză matematică - Culegere de probleme pentru seminarii, examene şi concursuri. Editura Mediamira, Cluj-Napoca, 2002.
2. Mircea Ivan et al. Culegere de Probleme Pentru Seminarii, Examene şi Concursuri. UT Press, Cluj-Napoca, 2000.

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.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Abilities of understanding and using creatively the concepts and proofs		Written examination		30%
Applications		Abilities of solving problems and applying algorithms		Written examination		70%
10.4 Minimum standard of performance						
Ability to present coherently a theoretical subject and to solve problems with practical content.						

Course responsible
Prof.dr. Dumitru Mircea Ivan

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	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	2.

2. Data about the subject

2.1	Subject name					Linear Algebra					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Prof. dr. Ioan RASA Ioan.Rasa@math.utcluj.ro					
2.4	Teachers in charge of applications					Conf. dr. Daniela Inoan , Conf. dr. Dalia Cimpean Daniela.Inoan@math.utcluj.ro ; Dalia.Cimpean@math.utcluj.ro					
2.5	Year of study	I	2.6	Semester	1	2.7	Assessment	exam	2.8	Subject category	DF/OB

3. Estimated total time

Sem.	Subject name	Lecture	Applications			Lecture	Applications			Individual study	TOTAL	Credit
		[hours / week.]				[hours / semester]						
			S	L	P		S	L	P			
1	**Linear Algebra**	**2**	**2**	**-**	**-**	**28**	**28**	**-**	**-**	**48**	**104**	**4**

3.1	Number of hours per week	4	3.2	of which, course	2	3.3	applications	2
3.4	Total hours in the teaching plan	56	3.5	of which, course	28	3.6	applications	28

Individual study	Hours
Manual, lecture material and notes, bibliography	20
Supplementary study in the library, online and in the field	4
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	21
Tutoring	0
Exams and tests	3
Other activities	0

3.7	Total hours of individual study	48
3.8	Total hours per semester	104
3.9	Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	Basic knowledge of Linear Algebra and Analytic Geometry
4.2	Competence	Competences in elementary Linear Algebra and Analytic Geometry: matrices, determinants, linear systems, vectors and lines in plane

5. Requirements (where appropriate)

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

6. Specific competences

Professional competences	**C1 –** Operating with basic Mathematical, Engineering and Computer Science concepts **C1.1 –** Recognizing and describing concepts that are specific to the fields of calculability, complexity, programming paradigms, and modeling computational and communication systems **C1.3 –** Building models for various components of computing systems **C1.5 –** Providing a theoretical background for the characteristics of the designed systems

Cross competences	N/A

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

7.1	General objective	A presentation of the concepts, notions, methods and fundamental techniques used in linear algebra and analytic geometry.
7.2	Specific objectives	Use of the matriceal calculus (in the general context of linear algebra) in order to solve problems in engineering. Use of the vectorial calculus (in the general context of analytic geometry) in modelling and solving practical problems concerning spatial forms.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Linear spaces. Definition. Linear subspaces. Examples.	Explanation Demonstration Collaboration Interactive activities	
2	Linear independence. Basis. Dimension. Change of basis.		
3	Inner - product spaces. Definition, properties, Schwarz' inequality. Examples		
4	Linear transformations. Definition, elementary properties, Kernel and Image.		
5	The matrix associated to a linear transformation. The standard construction. Expresions in terms of coordinates.		
6	Eigenvalues and eigenvectors. Definitions, invariant subspaces, characteristic polynomials.		
7	The diagonal form. Canonical forms, diagonalizability.		
8	The Jordan canonical form. Construction of a Jordan basis and a Jordan matrix.		
9	Functions of a matrix. The n-th power of a matrix. Elementary functions of a matrix.		
10	The adjoint operator. Definition, properties, examples.		
11	Self-adjoint operators, unitary operators, properties of the eigenvalues and eigenvectors.		
12	Bilinear forms, quadratic forms. The associated matrix.		
13	The canonical form. Reduction to a canonical form. The method of eigenvalues and Jacobi's method.		
14	Conics and quadrics. Reduction to a canonical form. Geometric properties.		

Bibliography

1. D. Cimpean, D. Inoan, I. Rasa, An invitation to Linear Algebra and Analytic Geometry, Ed. Mediamira, 2012
2. V. Pop, I. Rasa, Linear Algebra with Applications to Markov Chains, Ed. Mediamira, 2005

8.2. Applications (Seminars)		Teaching methods	Notes
1	Determinants, matrices, geometric vectors	Explanation Demonstration Collaboration Interactive activities	
2	Linear spaces, bases, dimension		
3	Inner-product spaces		
4	Linear transformations. Examples		
5	Linear transformations characterized in terms of matrices		
6	Invariant subspaces, eigenvalues, eigenvectors		
7	Diagonalizable linear transformations		
8	Jordan bases, Jordan canonical forms		
9	Elementary functions of a matrix, examples		
10	The adjoint operator		
11	Special classes of operators		
12	Bilinear forms, quadratic forms		
13	Reduction to a canonical form		

14	Conics and quadrics, reduction to a canonical form		

Bibliography

1. D. Cimpean, D. Inoan, I. Rasa, An invitation to Linear Algebra and Analytic Geometry, Ed. Mediamira, 2012
2. V. Pop, I. Corovei, Algebra pentru ingineri. Culegere de probleme, Ed. Mediamira, 2003.

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.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Abilities of understanding and using creatively the concepts and proofs		Written examination		30%
Applications		Abilities of solving problems and applying algorithms		Written examination		70%
10.4 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	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	3.

2. Data about the subject

2.1	Subject name					Special Mathematics I					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Prof. dr. Daniela ROŞCA Daniela.Rosca_at_math.utcluj.ro					
2.4	Teachers in charge of applications										
2.5	Year of study	I	2.6	Semester	1	2.7	Assessment	exam	2.8	Subject category	DF/OB

3. Estimated total time

Sem.	Subject name	Lecture	Applications			Lecture	Applications			Individual study	TOTAL	Credit
		[hours / week.]				[hours / semester]						
			S	L	P		S	L	P			
1	**Special Mathematics I**	**2**	**2**	**-**	**-**	**28**	**28**	**-**	**-**	**72**	**128**	**5**

3.1	Number of hours per week	4	3.2	of which, course	2	3.3	applications	2
3.4	Total hours in the teaching plan	56	3.5	of which, course	28	3.6	applications	28

Individual study	Hours
Manual, lecture material and notes, bibliography	28
Supplementary study in the library, online and in the field	14
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	13
Tutoring	7
Exams and tests	10
Other activities	0

3.7	Total hours of individual study	72
3.8	Total hours per semester	128
3.9	Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	Algebra, highschool level (real profile)
4.2	Competence	Notions of combinatorial theory (arrangements, permutations, combinations); sets and operations with sets; notions of mathematical logic; mathematical induction method, calculations with matrices

5. Requirements (where appropriate)

5.1	For the course	Blackboard, videoprojector, computer, graphic tablet
5.2	For the applications	Blackboard, videoprojector, computer, graphic tablet

6. Specific competences

Professional competences	**C1 –** Operating with basic Mathematical, Engineering and Computer Science concepts **C1.1 –** Recognizing and describing concepts that are specific to the fields of calculability, complexity, programming paradigms, and modeling computational and communication systems **C1.3 –** Building models for various components of computing systems **C1.5 –** Providing a theoretical background for the characteristics of the designed systems

Cross competences	N/A

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

7.1	General objective	A presentation of the concepts, notions and fundamental methods used in counting and discrete probability theory. A presentation of basic concepts and properties in graph theory, basic algorithms and theorems based in graph theory, and their mathematical proof.
7.2	Specific objectives	Develop and apply strategies for solving combinatorial problems; Identification of patterns in solving combinatorial counting problems; Modeling and formulation, in terms of probability theory and specific notations, of concrete problems coming from random experiments and random processes; Identify standard discrete distributions of probability for solving probabilistic problems; Interpretation of numerical results in the problems modeled using random variables; Modelling of concrete problems using graph theory notions and concepts; Application of specific algorithms to problems modeled by classical graph theory (trees, minimum spanning trees, coding and decoding trees, construction Eulerian trails and Hamiltonian paths, the Chinese postman problem, flow problems, etc..).

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Principles of counting and counting methods.	Windows Journal software for graphic tablet , videoprojection Explanation Demonstration Collaboration	
2	Recursions and generating functions.		
3	Introduction to graphs. Definitions, notations, general properties. Connectivity. Graphs and digraphs representation.		
4	Trees, sorting and searching: roted trees, decision trees, sorting trees.		
5	Binary trees and binary codes. Huffman codes.		
6	Spanning trees. Depth-first search, breadth-first search. Minimum spanning tree in weighted graphs - Prim's and Kruskal's algorithm.		
7	Minimum spanning trees in directed graphs - Chu-Liu-Edmonds algorithm. Shortest path - Dijkstra's algorithm. Greedy algorithms. General properties and greedy algorithm for the maximum weight problem.		
8	Bipartite graphs. Matchings. Matchings in bipartite graphs. Maximum matchings.		
9	Eulerian graphs and Hamiltonian graphs. The postman's problem.		
10	Networks, flows and cuts. Max flow min cut theorem.		
11	Introduction to discrete probabilities: the axioms of probabilities, conditional probabilities, total probability and Bayes' formula.		
12	Probabilistic schemes: binomial, multinomial, Poisson, geometric, negative binomial, Poisson's urns.		
13	Random variables, examples of discrete random variables, operations with random variables.		
14	Expected value and variance. Covariance. Chebyshev's theorem and weak law of large numbers.		

Bibliography

1. T. Toadere, Grafe, Teorie, algoritmi, aplicatii, Ed. Microinformatica, Cluj, 2002.
2. N. Vornicescu, Grafe. Teorie si algoritmi, Ed. Mediamira, 2005.
3. D. Rosca, Discrete Mathematics, Ed. Mediamira, 2007.
4. A. Mitrea, Fundamente de teoria probabilitatilor, Ed. UTPress, 2003.
5. K. Bogart, S. Drysdale, C. Stein, Discrete Math for Computer Science Students, available online at *http://www.cs.dartmouth.edu/~ac/Teach/cs21-Winter04/*
6. N. L. Biggs, Discrete Mathematics, Oxford University Press, 2005.
7. R. Durret, The Essentials of Probability, Duxbury Press, 1994.

8.2. Applications (Seminars)		Teaching methods	Notes
1	Counting. The pigeonhole principle, counting set of pairs. Functions, words. Selections with and without repetition.	Windows Journal software for graphic tablet , videoprojection Explanation Demonstration Collaboration	
2	Partitions, classifications, distributions.		
3	Walks, trails, cycles in graphs. Graphs and digraphs representations.		
4	Problems related to graphs.		
5	Properties and applications of incidence matrices and adjacency matrices.		
6	Applications of trees: decision problems, sorting algorithms.		
7	Spanning trees: depth-first search, breadth-first search trees, properties. Algorithms for minimum spanning trees.		
8	Algorithms for shortest path. Greedy algorithms for vertex coloring. General notions about planar graphs.		
9	Bipartite graphs and matchings. Construction of alternating paths.		
10	Eulerian and Hamiltonian graphs. Algorithms for Eulerian and Hamiltonian tours.		
11	Calculation of probabilities.		
12	The theorem on total probability and Bayes' formula with applications.		
13	Construction of random variables and calculation expected value and variance.		
14	Applications of the weak law for large numbers.		

Bibliography

1. J. A. Bondy, U.S.R. Murty, Graph theory with applications, available online at http://www.ecp6.jussieu.fr/pageperso/bondy/books/gtwa/gtwa.htm
2. J. Gross, J. Yellen, Graph Theory and its Applications, CRC Press, 1999
3. Hannelore Lisei, Sanda Micula, Anna Soos, *Probability Theory through Problems and applications*, Cluj University Press, 2006.
4. Arthur Enghel - *Probleme de matematică: strategii de rezolvare*, Ed. Gil, 2006.

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

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Abilities of understanding and reproducing the concepts and proofs		Written examination		30.00%
Applications		Abilities of solving problems and applying algorithms		Written examination		70.00%
10.4 Minimum standard of performance						
05/10/14						

Course responsible
Prof. dr. Daniela ROŞCA Potolea

Head of department
Prof.dr.eng. Rodica

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	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	4.

2. Data about the subject

2.1	Subject name					Logic Design					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Prof. dr. eng. Octavian Creţ – Octavian.Cret@cs.utcluj.ro					
2.4	Teachers in charge of applications					As. Drd.Ing. Diana Irena Pop Ing.Cristian Turicu					
2.5	Year of study	I	2.6	Semester	1	2.7	Assessment	exam	2.8	Subject category	DID/OB

3. Estimated total time

Sem.	Subject name	Lecture	Applications			Lecture	Applications			Individual study	TOTAL	Credit
		[hours / week.]				[hours / semester]						
			S	L	P		S	L	P			
1	**Logic Design**	**2**	**-**	**2**	**-**	**28**	**-**	**28**	**-**	**74**	**130**	**5**

3.1	Number of hours per week	4	3.2	of which, course	2	3.3	applications	2
3.4	Total hours in the teaching plan	56	3.5	of which, course	28	3.6	applications	28

Individual study	Hours
Manual, lecture material and notes, bibliography	25
Supplementary study in the library, online and in the field	17
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	17
Tutoring	6
Exams and tests	9
Other activities	0

3.7	Total hours of individual study	74
3.8	Total hours per semester	130
3.9	Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	• N/A
4.2	Competence	• Mathematics (Algebra), Physics (electricity)

5. Requirements (where appropriate)

5.1	For the course	• A minimum of 75% course attendance rate is mandatory for being admitted to the final exam
5.2	For the applications	• Preliminary preparation of summaries from the indicated bibliography (laboratory textbook)

6. Specific competences

Professional competences	**C1 –** Operating with basic Mathematical, Engineering and Computer Science concepts **C1.1 –** Recognizing and describing concepts that are specific to the fields of calculability, complexity, programming paradigms, and modeling computational and communication systems **C1.2 –** Using specific theories and tools (algorithms, schemes, models, protocols, etc.) for explaining the structure and the functioning of hardware, software and communication systems **C1.3 –** Building models for various components of computing systems **C1.4 –** Formal evaluation of the functional and non-functional characteristics of computing systems **C1.5 –** Providing a theoretical background for the characteristics of the designed systems

Cross competences	N/A

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

7.1	General objective	• The main objective of this discipline is to give to the students the bases of Logic Design, in order to make them able to analyze, design and implement any digital system.
7.2	Specific objectives	To reach this goal, students will learn to: • Analyze and synthesize combinational logic systems; • Analyze and synthesize synchronous and asynchronous sequential machines; • Apply digital system design principles and descriptive techniques; • Utilize programmable devices such as FPGAs and PLDs to implement digital systems; • Understand timing issues in digital systems and study these via digital circuit simulation.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Introduction. Number systems and codes, errors	Blackboard presentation discussions	N/A
2	Number representation systems. Binary arithmetic		
3	Boolean Algebra. Boolean functions. Logic gates. Digital systems and functions representation		
4	Methods for minimizing Boolean functions and systems of functions		
5	Combinational logic circuits (CLCs) analysis and design (synthesis). SSI and MSI CLCs.		
6	Methods for designing digital systems with SSI, MSI, LSI and VLSI circuits. Combinational Hazard.		
7	Sequential logic circuits. Latches and Flip-Flops.		
8	Flip-Flops applications: frequency dividers, counters		
9	Flip-Flops applications: data registers, converters, memories		
10	Methods for designing digital systems using Flip-Flops		
11	Methods for designing digital systems using memories, multiplexers, decoders, counters		
12	Methods for designing sequential synchronous systems		
13	Methods for designing digital systems using programmable devices (I)		
14	Methods for designing digital systems using programmable devices (II)		

Bibliography

1. Contemporary Logic Design, Randy H. Katz, Benjamin Cunnings / Addison Wesley Publishing Co., 1993.
2. Digital Design Principles and Practices, John F. Wakerly, Prentice-Hall, 2000.
3. FPGA-based System Design, Wayne Wolf, PRENTICE HALL Professional Technical Reference Upper Saddle River, NJ 07458 www.phptr.com ISBN: 0-13-142461-0.

8.2. Applications (Laboratory)		Teaching methods	Notes
1	Basic Logic Circuits	Practical work on test boards, FPGA boards, specialized software, blackboard presentations, supplemental explanations and discussions	N/A
2	ActiveHDL Schematic Editor and Simulator (I)		
3	ActiveHDL Schematic Editor and Simulator (II)		
4	Combinational Logic Circuits (I)		
5	Combinational Logic Circuits (II) – MSI circuits		
6	Combinational Logic Circuits (III) – Complex circuits		
7	Synthesis of Combinatorial Logic Circuits using Programmable Logic Devices		
8	Flip-flops		
9	Counters (I)		
10	Counters (II)		
11	Registers and Shift Registers		

12	The XILINX FPGA Family		
13	Synthesis of Sequential Logic Circuits using FPGA Devices		
14	Laboratory test		

Bibliography

1. Analiza şi sinteza dispozitivelor numerice, Îndrumător de laborator, Ediţia a-3-a, L. Văcariu, O. Creţ, A. Neţin, Ed. U.T. Press, Cluj-Napoca, 2009.

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

• Since this discipline is a basic one in Computer Science, its content is “classic” but also modern because it familiarizes students with the modern principles of Logic Design (utilization of modern simulation and synthesis tools, FPGA and CPLD-based design etc.). Its contents have been discussed with major academia and industry actors from Romania, Europe and U.S.A. and it has been evaluated several times by Romanian Governmental Agencies like CNEAA and ARACIS.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Problems solving abilities		Written Exam		70%
		Presence, (Inter)activity				
Applications		Problems solving abilities				30%
		Presence, (Inter)activity				
10.4 Minimum standard of performance						
• Modeling and solving typical Logic Design problems using the domain-specific formal apparatus						

Course responsible
Prof. dr. eng. Octavian Creţ

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	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	5.

2. Data about the subject

2.1	Subject name					Computer Programming					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					S.l. dr. ing. Marius Joldoş – Marius.Joldos@cs.utcluj.ro					
2.4	Teachers in charge of applications					As.dr. eng. Ciprian Pocol – Ciprian.Pocol@cs.utcluj.ro					
2.5	Year of study	I	2.6	Semester	1	2.7	Assessment	exam	2.8	Subject category	DF/OB

3. Estimated total time

Sem.	Subject name	Lecture	Applications			Lecture	Applications			Individual study	TOTAL	Credit
		[hours / week.]				[hours / semester]						
			S	L	P		S	L	P			
1	Computer Programming	**2**		**2**		**28**		**28**		**74**	**130**	**5**

3.1	Number of hours per week	4	3.2	of which, course	2	3.3	applications	2
3.4	Total hours in the teaching plan	56	3.5	of which, course	28	3.6	applications	28

Individual study	Hours
Manual, lecture material and notes, bibliography	27
Supplementary study in the library, online and in the field	5
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	10
Tutoring	7
Exams and tests	5
Other activities	0

3.7	Total hours of individual study	74
3.8	Total hours per semester	130
3.9	Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications	

6. Specific competences

Professional competences	**C1 –** Operating with basic Mathematical, Engineering and Computer Science concepts **C1.1 –** Recognizing and describing concepts that are specific to the fields of calculability, complexity, programming paradigms, and modeling computational and communication systems **C1.2 –** Using specific theories and tools (algorithms, schemes, models, protocols, etc.) for explaining the structure and the functioning of hardware, software and communication systems **C1.3 –** Building models for various components of computing systems

Cross competences	N/A

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

7.1	General objective	To learn how to use a general purpose high level programming language for writing programs
7.2	Specific objectives	• To understand a small-sized problem stated in a natural language, and develop a solution as a computer program. • To understand code written by other programmers and reason critically about them. • To design and implement computer programs in C using the structured/modular approach. • To learn a good programming style. • To determine the causes of programming errors and correct them

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Programming Languages. Stages of Problem solving Using Computers. Algorithm – Definition, Properties. C features. Simple Data Types. Simple I/O	Lectures, demos and discussions	Uses a video-projector
2	Programming Style. Digital Representations. Variables and Expressions		
3	C Statements. C Preprocessing		
4	Functions (Structure, Invocation, Parameter passing, Functions as parameters, Variable scope). Functions for character processing		
5	Modular Programming. Debugging		
6	Pointers. Memory Management.		
7	Pointers and Arrays. Function Pointers		
8	C Character Strings. C library		
9	Structures, unions, enumerations. User-defined Types		
10	File Handling. High Level I/O.		
11	Recursion. Mechanism and Examples		
12	Working with time. I/O redirection. Variable length argument lists. Command line arguments. Self referential structures		
13	Sample Programs Explained. (Combinatorial generation. Simple Sorting Algorithms)		
14	Review		

Bibliography

1. Paul and Harvey Deitel, C: How to program, Pearson Education, 6ed, 2010
2. K.N. King, C Programming: A modern Approach, W.W. Norton, 2008
3. Stephen Prata, C Primer Plus, Sams, 5ed, 2004
4. Brain W. Kernighan, Dennis M. Ritchie – The C Programming Language, Prentice Hall, Inc., 1988.
5. William H. Press – Numerical Recipes in C - The Art of Scientific Computing – freely available on the Web (same address)

8.2. Applications (Laboratory)		Teaching methods	Notes
1	Pseudo code. Interactive Development Environments for C. Setting up and Using Codeblocks IDE	Tutoring, discussions, and assisted program development	PCs equipped with MinGW C and Code-blocks IDE
2	Simple IO in C		
3	Expressions in C		
4	Statements in C		
5	Functions. Debugging C programs		
6	Modular Programming		
7	Pointers. Pointers and Arrays		
8	Memory allocation. Pointers to functions		
9	String manipulation		

10	Structures, Unions, Enumerations		
11	High level I/O in C.		
12	Recursion		
13	Review		
14	Laboratory test		
Bibliography 1. Moodle site for course available at: https://labacal.utcluj.ro			

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

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Written exam		Written exams: In-class tests Final		 10% 60%
Applications		Laboratory test		Evaluation of program implementation		30%
10.4 Minimum standard of performance						
Correct solutions for min. 60% of the exam topics and applications						

Course responsible
S.l.dr.ing. Marius Joldos

Head of department
Prof.dr.ing. Rodica Potolea

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	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	6.

2. Data about the subject

2.1	Subject name					Physics					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Assoc. prof. dr. Radu Fechete					
2.4	Teachers in charge of applications					As. drd. Mihai Gabor; Research As. drd. Moldovan Dumitrita					
2.5	Year of study	I	2.6	Semester	1	2.7	Assessment	Colloquium	2.8	Subject category	DF/OB

3. Estimated total time

Sem.	Subject name	Lecture	Applications			Lecture	Applications			Individual study	TOTAL	Credit
		[hours / week.]				[hours / semester]						
			S	L	P		S	L	P			
1	**Physics**	**3**	**-**	**1**	**-**	**42**	**-**	**14**	**-**	**48**	**104**	**4**

3.1	Number of hours per week	4	3.2	of which, course	3	3.3	applications	1
3.4	Total hours in the teaching plan	56	3.5	of which, course	42	3.6	applications	14

Individual study	Hours
Manual, lecture material and notes, bibliography	16
Supplementary study in the library, online and in the field	10
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
Tutoring	14
Exams and tests	4
Other activities	-

3.7	Total hours of individual study	48
3.8	Total hours per semester	104
3.9	Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	Good knowledge in high school physics Good knowledge in high school mathematics Some knowledge in operating computers (Word, Power Point, Excel)
4.2	Competence	To know how to plot a graph on millimeter graph paper, use of scientific calculator, to work in team.

5. Requirements (where appropriate)

5.1	For the course	Blackboard, Multi-media projector.
5.2	For the applications	Equipment from Physics laboratory.

6. Specific competences

Professional competences	**C1 –** Operating with basic Mathematical, Engineering and Computer Science concepts **C1.1 –** Recognizing and describing concepts that are specific to the fields of calculability, complexity, programming paradigms, and modeling computational and communication systems **C1.3 –** Building models for various components of computing systems **C1.5 –** Providing a theoretical background for the characteristics of the designed systems
Cross competences	N/A

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

7.1	General objective	To identify, understand and explain the physical phenomenon. To identify the parts of a practical laboratory work and to explain how does it work using the theoretical concepts from the abstract. To measure different type of quantities using different devices. To process the experimental data and to determine based on them different physical quantities. To plot graphs and to determine different quantities using it. To solve problems using theoretical criteria on different physical phenomenon already studied.
7.2	Specific objectives	The students must know how to use: a multi-voltmeter; a frequency generator; a calliper and a micrometre; a thermometer with mercury and digital.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Introductions; Basics of kinematics: velocity, acceleration, linear motions, curvilinear motions, circular motion.	Oral presentation, discussion, problematization, notes on blackboard, multimedia presentation	Students are encouraged to ask questions
2	Dynamics laws, conservations laws: linear momentum, kinetically momentum, energy		
3	Oscillatory motion: linearly harmonically oscillator, dumped oscillations, forced oscillations, resonance, Superposition of parallel and perpendicular oscillations		
4	Barometric equations. Boltzmann distribution function. Waves. Wave function. Differential equation, Characteristic phenomena: reflection, refraction, interference, diffraction, dispersion, absorption		
5	Elastic waves. Longitudinal waves in solids, liquids and gases. Wave intensity. Acoustics: sounds quality, closed chambers acoustics, sound reverberation, Doppler-Fizeau effect, ultrasounds		
6	Electromagnetic waves: velocity, transversally, intensity, and range. Photometrical quantities. Polarization of light.		
7	Photonic optics: thermal radiation, photoelectrical effect, Compton effect, light pressure		
8	Waves attached to particles. Davisson-Germer experiment. Wave group. Schrödinger equation. Wave function properties. Potential gap. Potential barrier		
9	Hydrogen atom. Quantum numbers. Spin quantic number (magnetic loop, magnetic moment, orbital magnetic moment).		
10	Experimental proves of energy quantifications. Quantum transitions theory. Laser. Holography		
11	Electrons in solid body. Energy bands. Metals. Electrically conductibility		
12	Hall effect. Contact potential difference. Thermoelectrically effect. Peltier effect		
13	Intrinsic semiconductors. Extrinsic semiconductors. p-n Junction.		

	Transistor.		
14	Magnetic properties of solid body: magnetic moment, orbital magnetic moment, diamagnetism, paramagnetism, ferromagnetism. Superconductibility		

Bibliography

1 R. Fechete, Fundamental physics for engineers, course notes.
2 E. Culea, S. Nicoara, Fundamentals of Physics, RISOPRINT, Cluj-Napoca 2004
3 R. Fechete, Elemente de Fizica pentru Ingineri, Ed. UTPress, 2008.
4 I.Ardelean, Fizica pentru ingineri, Ed. UTPres, 2005.
5 I. Coroiu, E. Culea, Fizica I, Ed. UT. Press, 1999.

8.2. Applications (Laboratory)		Teaching methods	Notes
1	Longitudinal and transverse standing waves	Practical work in the laboratory, Problematization, discussions	Students are asked and encouraged to ask questions
2	Polarizations of light		
3	Optical spectroscopy		
4	The study of photoelectrical effect		
5	The study of thermoelectrically effect		
6	The study of Hall Effect		
7	The determination of the energy gap of a semiconductor		

Bibliography

1. R. Fechete, Fundamental physics for engineers, course notes.
2. Radu Fechete, Ramona Chelcea, Dumitriţa Moldovan, Simona Nicoară, Ilioara Coroiu, Codruţa Badea, Eugen Culea, Ioan Cosma, Nicolae Şerban, Fizică: Îndrumător de laborator, EDITURA U.T.PRESS, Cluj-Napoca, Romania, 2014, ISBN: 978-973-662-952-5.

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

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		The ability to answer to theoretical questions and to solve practical problems		Written test (mark T) and oral presentation of a specific task (mark R)		T is 60% R is 30%
Applications		The presence is compulsory (100%). The activity during classes is appreciated		Questions on each class (mark SL)		10%
10.4 Minimum standard of performance						
The final credit can be received only if each of the mark's components is fulfilled: N≥5 AND T≥5 AND R≥5 AND SL≥5.						

Course responsible
Assoc. prof. dr. Radu Fechete

Head of department
Prof.dr.ing. Rodica Potolea

SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	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	7.

2. Data about the subject

2.1	Subject name					Foreign Language I (English, French, German)					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer										
2.4	Teachers in charge of applications					Asist. drd. Ema Adam, adam@lang.utcluj.ro Asist.drd. Monica Negoescu, Negoescu@mail.utcluj.ro Asist.dr. Sanda Pădureţu Sanda.Paduretu@lang.utcluj.ro Asist.dr. Maria Olt maria.olt@lang.utcluj.ro Asist.dr. Cecilia Policsek cecilia.policsek@lang.utcluj.ro Asist.dr. Florina Codreanucodreanu.florina@gmail.com Lect. dr. Mona Tripon Mona.Tripon@lang.utcluj.ro Asist. drd. Aurel BărbînţăAurel.Barbinta@lang.utcluj.ro Asist.dr. Adina Forna adina.forna@yahoo.com					
2.5	Year of study	I	2.6	Semester	1	2.7	Assessment	Colloquium	2.8	Subject category	DC/OB

3. Estimated total time

Sem.	Subject name	Lecture	Applications			Lecture	Applications			Individual study	TOTAL	Credit
		[hours / week.]				[hours / semester]						
			S	L	P		S	L	P			
1	**Foreign Language I (English, French, German)**	**-**	**2**	**-**	**-**	**-**	**28**	**-**	**-**	**24**	**52**	**2**

3.1	Number of hours per week	2	3.2	of which, course	-	3.3	applications	2
3.4	Total hours in the teaching plan	28	3.5	of which, course	-	3.6	applications	28

Individual study	Hours
Manual, lecture material and notes, bibliography	8
Supplementary study in the library, online and in the field	4
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	8
Tutoring	
Exams and tests	4
Other activities	

3.7	Total hours of individual study	24
3.8	Total hours per semester	52
3.9	Number of credit points	2

4. Pre-requisites (where appropriate)

4.1	Curriculum	A2/B1 according to the Common European Framework for Languages
4.2	Competence	Team work

5. Requirements (where appropriate)

5.1	For the course	N/A
5.2	For the applications	Seminar attendance compulsory

6. Specific competences

Professional competences	N/A
Cross competences	**CT2 –** Identifying, describing and conducting processes in the projects management field, assuming different roles inside the team and clearly and concisely describing, verbally or in writing, in Romanian and in an international language, the own results from the activity field.

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

7.1	General objective	Development of communicative competence in an engineering professional context
7.2	Specific objectives	- Mastering basic vocabulary and language structures typical of sciences studied - Development of the skill of writing short technical texts

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1			
Bibliography			
8.2. Applications (Seminars)		Teaching methods	Notes
1	Introduction to languages for specific purposes	Conversation, improving the reading, writing, speaking, listening skills, working in pairs and groups	
2	Mathematics. Algebraic Formulae		
3	Geometry. Shapes and dimensions		
4	Infrastructure and manufacturing processes. Process description		
5	Safety norms.		
6	Writing instructions. Warnings. User guides		
7	Description of devices. Sensors		
8	Location. Calculi and measurements		
9	Properties of materials. Description		
10	Forces and their laws.		
11	Cause and effect, Discourse markers.		
12	Green technologies. Design and project evaluation		
13	Description of an operation and a process.		
14	Final test		

Bibliography

1. Munteanu, S-C**.** (2004) *Reading skills For Engineering Students***,** UTPress, Cluj-Napoca.
2. Granescu, M. et. al. ***Students' Grammar Of English***, UTPress, Cluj-Napoca, 2001.
3. Bonamy, D. *Technical English 1-2*, Longman, London
4. Tripon, Mona: *Faszination Technik. Sprachtrainer Deutsch für Studenten technischer Universitäten*. Editura Napoca Star, Cluj-Napoca, 2012. ISBN 978-973-647908-3
5. Odou M., Informatique.com, Clé international, 2010
6. Constantin Paun, Limba franceză pentru ştiinţă şi tehnică, EdituraNiculescu, Bucuresti, 1999
7. Vlaicu, R., *Grammaire du français scientifique et technique*, Cluj-Napoca, UTPRESS, ISBN 2007 973-662-2258-4

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 help students in a more flexible integration in the labour market, and have improved personal development. The introduction in the language for specific purposes will facilitate reading more documents in the field of study.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		-				
Applications		Assignments and tests are corrected and marked if submitted in due time. The undergraduate will be allowed to sit in the final test if he/she attends seminars in a proportion of 80% of the time.		Written test, Oral test		100%.
10.4 Minimum standard of performance						
The undergraduate will be allowed to sit in the final test, if he/she attends seminars in a proportion of 80% of the time. Final score: attendance= 1pct, written test =5 pct, oral test =4 pct. Pass score is received if 60 % of both tests is produced by the undergraduate.						

Head of department
Prof. dr. eng. Rodica Potolea

Course responsible
Conf.univ.dr. Marinela Grănescu

Teachers in charge of applications
Asist. drd. Ema Adam,
Asist.drd. Monica Negoescu,
Asist.drd. Sanda Pădureţu
Asist.dr. Maria Olt
Asist.dr. Cecilia Policsek
Asist. drd. Aurel Bărbînţă
Lect. dr. Mona Tripon
Asist. dr. Forina Codreanu
Asist. dr. Adina Forna

SYLLABUS

1.Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	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	8.

2. Data about the subject

2.1	Subject name					Sport I					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Assoc. prof. Marin Dumitrescu, PhD, marind@efs.utcluj.ro ,					
2.4	Teachers in charge of applications					Assoc. prof. Viorel Moisin, PhD, Lecturer Alina Rusu, PhD, Lecturer Mihai Olanescu, PhD student, As. prof. Bogdan Tanase					
2.5	Year of study	I	2.6	Semester	1	2.7	Assessment	verification	2.8	Subject category	DC/OB

3. Estimated total time

Sem.	Subject name	Lecture	Applications			Lecture	Applications			Individual study	TOTAL	Credit
		[hours / week.]				[hours / semester]						
			S	L	P		S	L	P			
1	**Sport I**	**-**	**2**	**-**	**-**	**-**	**28**	**-**	**-**	**-**	**28**	**1**

3.1	Number of hours per week	2	3.2	of which, course	-	3.3	applications	2
3.4	Total hours in the teaching plan	28	3.5	of which, course	-	3.6	applications	28

Individual study	Hours
Manual, lecture material and notes, bibliography	-
Supplementary study in the library, online and in the field	-
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	-
Tutoring	-
Exams and tests	-
Other activities	-

3.7	Total hours of individual study	-
3.8	Total hours per semester	28
3.9	Number of credit points	1

4. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	physically fit, necessary skills, knowledge, skills and abilities gained in classes I-XII

5. Requirements (where appropriate)

5.1	For the course	Muncii Blvd, no.103-105, Cluj-Napoca, Politehnica Swimming Complex
5.2	For the applications	Sports Hall, Muncii Blvd, no.103-105, Cluj-Napoca Outdoor and Fitness - Complex Polytechnic

6. Specific competences

Professional competences	N/A

Cross competences	**CT2 –** Identifying, describing and conducting processes in the projects management field, assuming different roles inside the team and clearly and concisely describing, verbally or in writing, in Romanian and in an international language, the own results from the activity field.

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

7.1	General objective	• Harmonious physical development • Maintain health at a high standard
7.2	Specific objectives	• Capacity development effort • Learning and motor skills development • Education volitional qualities

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	-		
Bibliography			
8.2. Applications (Seminars)		Teaching methods	Notes
1-2	Discipline demands and promotion criterion	interactive	
3-4	Testing of movement skills, capacities and knowledge accumulated in secondary and high school		
5-6	Adaptation with physical effort		
7-8	Learning of technical process (methods) accessible and possible		
9-10	Repetition (improving) of technical process (methods).		
11-12	Learning new technical process (methods)		
13-14	Semestrial verification		

Bibliography

1. Curs de Educaţie fizică – Litografiat UTC-N
2. Dezvoltare fizică generală pentru studenţi – UTC-N
3. Cultură fizică pentru tineret - UTPRES

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

Sports activity there in the curriculum of universities and faculties in the country and abroad. Content is consistent with the expectations of professional associates and employers epistemic community representative of the afferent program.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		-		-		
Applications		70% + 30% Frequency Active Participation, sports skills and advances		By passing control samples		
10.4 Minimum standard of performance						

Course responsible
Assoc. prof. Marin Dumitrescu

Head of department
Prof.dr.eng. Rodica Potolea