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	8.

2. Data about the subject

2.1	Subject name					Mathematical analysis II (Integral calculus and differential equations)					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Prof. dr. Dumitru Mircea Ivan - mircea.ivan@math.utcluj.ro					
2.4	Teachers in charge of applications					Assoc.prof.dr. Mircea Rus – rus.mircea@math.utcluj.ro					
2.5	Year of study	I	2.6	Semester	2	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			
2	**Mathematical analysis II (Integral calculus and differential equations)**	**2**	**2**	**-**	**-**	**28**	**28**	**-**	**-**	**69**	**125**	**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	20
Supplementary study in the library, online and in the field	20
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	20
Tutoring	5
Exams and tests	4
Other activities	0

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

4. Pre-requisites (where appropriate)

4.1	Curriculum	Basic knowledge Integral Calculus
4.2	Competence	Competences in elementary Integral Calculus: primitives, definite integrals.

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 specific concepts to calculability, complexity, programming paradigms and modeling of computing 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 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 integral calculus.
7.2	Specific objectives	Use of the integral calculus in order to solve problems in engineering.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Ordinary differential equations (ODE) of order one	Explanation Demonstration Collaboration Interactive activities	
2	Linear homogeneous ODE with constant coefficients		
3	Linear non-homogeneous ODE with constant coefficients		
4	Positive and linear functionals.		
5	Riemann-Stieltjes integral. Primitives.		
6	Improper integrals.		
7	Integrals depending on parameters.		
8	Special functions		
9	Paths. Vector fields. Line integrals with respect to the coordinates. Circulation.		
10	Differential Forms. Exact differential forms. Path-independence. Work.		
11	Line integrals with respect to the arc length. Total mass, center of mass.		
12	Double integral. Green-Riemann formula.		
13	Surface integral. Flux of vector field across a surface. Stokes' Theorem.		
14	Volume integral. Gauss-Ostrogradsky Theorem. MATHEMATICA capabilities.		

Bibliography

1. Mircea Ivan. Elemente de calcul integral. Mediamira, Cluj-Napoca, 2003. ISBN 973-9357-40-7.
2. Dumitru Mircea Ivan. Calculus. Editura Mediamira, Cluj-Napoca, 2002. ISBN 973-9358-88-8.

8.2. Applications (Seminars)		Teaching methods	Notes
1	Ordinary differential equations (ODE) of order one (Exercises)	Explanation Demonstration Collaboration Interactive activities	
2	Linear homogeneous ODE with constant coefficients (Exercises)		
3	Linear non-homogeneous ODE with constant coefficients (Exercises)		
4	Positive and linear functionals (Exercises)		
5	Riemann-Stieltjes integral. Primitives (Exercises)		
6	Improper integrals (Exercises)		
7	Integrals depending on parameters(Exercises)		
8	Special functions (Exercises)		
9	Line integrals with respect to the coordinates(Exercises)		
10	Differential Forms (Exercises)		
11	Line integrals with respect to the arc length. (Exercises)		
12	Double integral. Green-Riemann formula. (Exercises)		
13	Surface integral. (Exercises)		

14	Volume integral. MATHEMATICA related capabilities. (Exercises)		

Bibliography

1. Dumitru Mircea Ivan, et al. Analiză matematică - Culegere de probleme pentru seminarii, examene şi concursuri. Editura Mediamira, Cluj-Napoca, 2002. ISBN 973-9357-20-2.
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. Mircea Ivan

Head of department
Prof.dr.eng. Rodica Potolea

SYLLABUS

6. 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	9.

7. Data about the subject

2.1	Subject name					Assembly Language Programming					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Assoc. Prof. dr. eng. Emil Cebuc- Emil.Cebuc@cs.utcluj.ro					
2.4	Teachers in charge of applications					Assoc. Prof. dr. eng. Emil Cebuc- Emil.Cebuc@cs.utcluj.ro As. Dr. Ing. Dragos Lisman - dragos.lisman@mecon.utcluj.ro Ing. Bogdan Laslo - bogdan.laslo@emerson.com					
2.5	Year of study	II	2.6	Semester	3	2.7	Assessment	exam	2.8	Subject category	DS/OB

8. Estimated total time

Sem.	Subject name	Lecture	Applications			Lecture	Applications			Individual study	TOTAL	Credit
		[hours / week.]				[hours / semester]						
			S	L	P		S	L	P			
3	**Assembly Language Programming**	**2**	**1**	**2**	**-**	**28**	**14**	**28**	**-**	**30**	**100**	**4**

3.1	Number of hours per week	5	3.2	of which, course	2	3.3	applications	3
3.4	Total hours in the teaching plan	70	3.5	of which, course	28	3.6	applications	42
Individual study								Hours
Manual, lecture material and notes, bibliography								10
Supplementary study in the library, online and in the field								7
Preparation for seminars/laboratory works, homework, reports, portfolios, essays								10
Tutoring								0
Exams and tests								3
Other activities								0

3.7	Total hours of individual study	30
3.8	Total hours per semester	100
3.9	Number of credit points	4

9. Pre-requisites (where appropriate)

4.1	Curriculum	None
4.2	Competence	None

10. Requirements (where appropriate)

5.1	For the course	Projector, Blackboard
5.2	For the applications	PC with 32 bit operating system , 1 PC per student, DOSBox

11. Specific competences

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

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

7.1	General objective	Knowledge of Microprocessor structure and low level programming
7.2	Specific objectives	Is able to use various addressing modes, assembly language programming techniques, use specific programming tools

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	C1. Introduction, data representation	PowerPoint presentations, Examples of Program listings, lecture	
2	C2. ISAx86 Architecture, addressing modes		
3	C3. x86 Instruction format		
4	C4. MASM x86 directives ALP program prototypes		
5	C5. ISA x86 Instruction set – data transfer, address transfer arithmetic and logical instructions		
6	C6. ISA x86 Instruction set – shift, rotate, flow control instructions		
7	C7. ISA x86 Instruction set – 386, software interrupt, string instructions		
8	C8. Coprocessor structure and operation, data transfer, arithmetic instructions		
9	C9. Coprocessor math functions, misc. instructions		
10	C10. MMX extensions – MMX calculus, MMX instructions		
11	C11. Protected mode operations, memory management, segmentation, privilege levels		
12	C12. System function calls		
13	C13. Multiple module programs		
14	C14. Program optimisation		

Bibliography

1. PPT lecture notes at: ftp.utcluj.ro/pub/users/cemil /ALP
2. D. Gorgan, G. Sebestyen, Proiectarea calculatoarelor", Editura albastra, 2005,
3. , "AoA - The Art of Assembly language", la adresa: webster.cs.ucr.edu/AoA/DOS/pdf/
4. S. Nedevschi, "Microprocesoare", Editura UTCN, 1994

8.2. Applications (Laboratory)		Teaching methods	Notes
1	L1. Information Representation	Interactive tutoring, learn bye example	
2	L2. Tools, ISA x86 Architecture, addressing modes		
3	L3. Addressing Modes and address calculus		
4	L4. Pseudo instruction Usage		
5	L5. ISA x86: Instructions data transfer , arithmetical and logical		
6	L6. ISA x86: Instructions: shift and rotate		
7	L7. ISA x86: Instructions: flow control, other instructions		
8	L8. Real number		

9	L9. Complex operations		
10	L10. Multimedia operations		
11	L11. Program optimisation		
12	L12. System function call		
13	L13. Advanced programming techniques		
14	L14. Colloquium		

Bibliography

Art of assembly language, Randall Hyde available at: ftp://ftp.utcluj.ro/pub/users/cemil/asm/
Lab Workbook, Emil Cebuc et. All. Available at: ftp://ftp.utcluj.ro/pub/users/cemil/asm/labs/

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

Course and lab contents are discussed and compared to similar courses in other universities and with software companies like Bitdefender

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Knows microprocessor structure, number representation, x86 basic instruction set, system function calls and assembly program structure		Midterm written exam Final Oral exam Admittance to final exam conditioned by successful lab colloquium		2/9 4/9
Applications		Is able to develop a medium size program using specific tools		Lab Colloquium		3/9
10.4 Minimum standard of performance						
Is able to develop a medium size interactive assembly language program using specific tools						

Course responsible
Conf. dr. Emil Cebuc

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	10.

2. Data about the subject

2.1	Subject name	Electrotechnics									
2.2	Subject area	Computer Science and Information Technology									
2.3	Course responsible/lecturer	Assoc. prof. dr. eng. Laura Darabant – Laura.Darabant@et.utcluj.ro									
2.4	Teachers in charge of applications	Assoc. prof. dr. eng. Laura Darabant – Laura.Darabant@et.utcluj.ro									
2.5	Year of study	I	2.6	Semester	2	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			
2	**Electrotechnics**	**2**	**-**	**1**	**-**	**28**	**-**	**14**	**-**	**83**	**125**	**5**

3.1	Number of hours per week	3	3.2	of which, course	2	3.3	applications	1
3.4	Total hours in the teaching plan	42	3.5	of which, course	28	3.6	applications	14

Individual study	Hours
Manual, lecture material and notes, bibliography	23
Supplementary study in the library, online and in the field	22
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	25
Tutoring	10
Exams and tests	3
Other activities	0

3.7	Total hours of individual study	83
3.8	Total hours per semester	125
3.9	Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	Mathematics I, II; Physics
4.2	Competence	N/A

5. Requirements (where appropriate)

5.1	For the course	N/A
5.2	For the applications	The presence of the lab is mandatory

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	Operating with basic concepts of electrical engineering
7.2	Specific objectives	1. Acquiring theoretical knowledge's regarding electrotechnics. 2. Acquiring practical skills regarding electrical circuits.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Electric and magnetic quantities. Static electric and magnetic fields (the electric field in free space and in material, electric current, the magnetic field in free space and in material)	Multimedia, PowerPoint Presentations, Demonstration board	
2	Laws and theorems of electromagnetic field		
3	Electrical capacitance, energy and forces		
4	Magnetic circuits. Self-inductance and mutual inductance. Magnetic energy and forces.		
5	Basic concepts, units and laws of circuit theory (characteristic values, power in sinusoidal regime, representation of sinusoidal functions by vectors and complex numbers)		
6	The characterisation of the linear circuits in complex plane, the complex form of some theorems		
7	Equivalent impedances (series and parallel connection, without mutual inductance, with mutual inductance, real condenser, real inductance, air core transformer)		
8	Resonance (in series, parallel, real, inductively coupled circuits, power factor improvement)		
9	Two-port networks (equations, equivalent circuits, open-circuit and short-circuit tests, characteristic impedance, propagation constant, filters)		
10	Network theorems (th superposition theorem, Thevenin-Norton theorem, mesh or loop analysis, node analysis, matrix methods)		
11	Transient regime of linear circuits (continuity conditions, transient behaviour of the R-L, R-C and R,L,C)		
12	Transient regime of linear circuits (the Laplace transform, Duhamel integral, state variable method)		
13	Study-state periodic non-sinusoidal regime (Fourier expansion, power, network analysis)		
14	Transmission lines (the primary line parameters, the equations of the transmission line, voltage and current waves on long lines, distortionless lines)		

Bibliography

1. The Theory of Electric Circuits, authors: RV Ciupa, V. Ţopa, Casa Cartii de Stiinta Publishing House, 2003, ISBN 973-9204-98-8
2. Simion, E., Maghiar, T., *Electrotehnica*, E.D.P., Bucureşti, 1982
3. Mocanu, C. I., *Teoria câmpului electromagnetic,* E.D.P., Bucureşti, 1981

8.2. Applications (Laboratory)		Teaching methods	Notes
1	Determination of the spectrum and equipotential surfaces of an electric field using a electrokinetic model	Practical exercises	
2	The study of a magnetic circuit. The measurement of the iron losses using an oscilloscope		
3	Representation of sinusoidal functions by vectors and complex numbers		
4	Analysis of the R,L,C series and parallel circuits, of the voltage and current resonances		
5	Power transfer in inductively coupled circuits		
6	The study of a circuit in non-sinusoidal regime		
7	The study of the transient regime, methods for solving circuits in transient regime		

Bibliography

1. Răduleţ, R., *Bazele electrotehnicii. Probleme.*, E.D.P., Bucureşti, 1981
2. Dan Doru Micu, **Laura Darabant**, Denisa Stet, Mihaela Cretu, Andrei Ceclan, Levente Czumbil, Teoria circuitelor electrice. Probleme, UT Press, Cluj-Napoca, 978-606-737-140-6, 2016, 280 pagini;

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				Three hours written examination, written test (WT)		0.8 WT
Applications				Laboratory works (LW)		0.2 LW
10.4 Minimum standard of performance						
N=0,8 WT + 0,2 LW Pass conditions: : N≥5; LW≥5						

Course responsible
Assoc.prof.dr.eng. Laura Darabant

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	11.

2. Data about the subject

2.1	Subject name					Digital Systems Design					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Prof. dr. eng. Creţ Octavian Augustin – Octavian.Cret@cs.utcluj.ro					
2.4	Teachers in charge of applications					As.Drd.Ing. Diana Irena Pop – Diana.Pop@cs.utcluj.ro Dipl. eng. Mihai Timar – mitis2010@gmail.com					
2.5	Year of study	I	2.6	Semester	2	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			
2	**Digital Systems Design**	**3**	**-**	**2**	**-**	**42**	**-**	**28**	**-**	**80**	**150**	**6**

3.1	Number of hours per week	5	3.2	of which, course	3	3.3	applications	2
3.4	Total hours in the teaching plan	70	3.5	of which, course	42	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	80
3.8	Total hours per semester	150
3.9	Number of credit points	6

4. Pre-requisites (where appropriate)

4.1	Curriculum	Logic Design
4.2	Competence	At least one high level programming language (i.e. C or PASCAL)

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	**C2 –** Designing hardware, software and communication components **C2.1 -** Describing the structure and functioning of computational, communication and software components and systems **C2.2 –** Explaining the role, interaction and functioning of hardware, software and communication components **C2.3 –** Building the hardware and software components of some computing systems using algorithms, design methods, protocols, languages, data structures, and technologies **C2.4 –** Evaluating the functional and non-functional characteristics of the computing systems using specific metrics **C2.5 –** Implementing hardware, software and communication 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 Digital Systems Design, in order to make them able to analyze, design and implement any complex digital system.
7.2	Specific objectives	To reach this goal, students will learn to: • Apply Digital System Design principles and descriptive techniques; • Understand various aspects of Automata Theory with applications in the field of Digital Systems Design; • Describe any digital system in VHDL; • Utilize programmable devices such as FPGAs and PLDs to implement digital systems.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	VHDL hardware description language – basic design units, signals	Blackboard presentation discussions	N/A
2	VHDL hardware description language – generics, constants, operators, data types, attributes		
3	VHDL hardware description language – sequential domain		
4	VHDL hardware description language – concurrent domain		
5	Creating testbenches for simulating and testing circuits in VHDL		
6	Automata (Finite State Machines) Theory – classification, definitions, formal models		
7	Microprogramming		
8	Microprogrammed Devices		
9	Designing Synchronous Automata		
10	Analysis and Design (Synthesis) of Asynchronous Automata (I)		
11	Analysis and Design (Synthesis) of Asynchronous Automata (II)		
12	Automata Identification		
13	Lossless Machines		
14	Linear Automata		

Bibliography
1. Digital Design Principles and Practices, John F. Wakerly, Prentice-Hall, 2000.
2. Automate programabile, Th. Borangiu, R. Dobrescu, Ed. Academiei, 1986.
3. Advanced Digital Logic Design Using VHDL, State Machines, and Synthesis for FPGA's, Sunggu Lee, Thomson-Engineering; 1 edition (April 25, 2005), ISBN 0534466028.
4. PowerPoint slides for VHDL and Automata Theory lectures + sets of problems for the individual study: http://users.utcluj.ro/~lucia/index.html

8.2. Applications (Laboratory)		Teaching methods	Notes
1	Introduction to VHDL	Practical work	N/A

2	Basic design units in VHDL	on test boards, FPGA boards, specialized software, blackboard presentations, supplemental explanations and discussions	
3	Signals, generics, constants, in VHDL		
4	Operators, data types in VHDL		
5	Attributes in VHDL		
6	Sequential domain. Processes in VHDL		
7	Sequential statements in VHDL		
8	Concurrent domain in VHDL		
9	Concurrent statements in VHDL		
10	Sub-programs in VHDL		
11	Testbenches in VHDL		
12	Standard and predefined packages in VHDL		
13	Mini-projects delivery		
14	Lab test		

Bibliography

1. Limbajul VHDL, Îndrumător de laborator, Ediţia a-3-a. O. Creţ, L. Văcariu, Ed. U.T. Press, Cluj-Napoca, 2007.
2. PowerPoint slides for VHDL and Automata Theory lectures + sets of problems for the individual study: http://users.utcluj.ro/~lucia/index.html

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		60%
		Presence, (Inter)activity				
Homeworks		Problems solving abilities		Practical Evaluation		20%
Applications		Problems solving abilities		Practical Evaluation (hands-on)		20%
		Presence, (Inter)activity				
10.4 Minimum standard of performance						
• Modeling and solving typical Digital Systems Design problems using the domain-specific formal apparatus						

Course responsible
Prof.dr.eng. Octavian Cret

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	12.

2. Data about the subject

2.1	Subject name					Data Structures and Algorithms					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Lect. dr. eng. 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	2	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			
2	**Data Structures and Algorithms**	**3**	**-**	**2**	**-**	**42**	**-**	**28**	**-**	**80**	**150**	**6**

3.1	Number of hours per week	5	3.2	of which, course	3	3.3	applications	2
3.4	Total hours in the teaching plan	70	3.5	of which, course	42	3.6	applications	28

Individual study	Hours
Manual, lecture material and notes, bibliography	30
Supplementary study in the library, online and in the field	25
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	10
Tutoring	10
Exams and tests	5
Other activities	0

3.7	Total hours of individual study	80
3.8	Total hours per semester	150
3.9	Number of credit points	6

4. Pre-requisites (where appropriate)

4.1	Curriculum	Computer Programming course
4.2	Competence	Programming in C

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 **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	To acquaint the students with a wide range of fundamental algorithms and data structures. To learn how to use general methods for development of algorithms, as well as mathematical tools for analyzing the correctness and efficiency of algorithms.
7.2	Specific objectives	• To choose the appropriate data structure for modelling a given problem. • To compare and contrast the cost and benefits of dynamic and static structure implementations. • To compare iterative and recursive solutions for elementary problems. • To determine when a recursive solution is appropriate for a problem. • To determine the time and space complexity of simple algorithms and recursively defined algorithms. • To design and implement algorithms using development techniques such as: greedy, divide-and-conquer, backtracking, dynamic programming, branch and bound. • To write C programs that use data structures such as: arrays, linked lists, stacks, queues, trees, hash tables, and graphs. • To implement in C the most common sorting algorithms.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	About the course (objectives, outline, recommended reading). Problem solving. Notions of Algorithmics (growth of functions, efficiency, programming model). Stacks, queues. Lists	Lectures, demos and discussions	Uses a video-projector
2	More on lists. Implementation issues.		
3	Trees – definitions, traversals. ADT Tree. Implementations. Binary Search Trees.		
4	Sets ADTs and Implementations. Dictionary ADT. Hash Tables. Mapping ADT.		
5	Priority Queue ADT. Tries		
5	Advanced Set Representation Methods. AVL trees. 2-3 Trees. Union-Find Set ADT.		
6	Directed Graphs. Definitions. Representations. ADT's. Single Source Shortest Path Problem (Dijkstra, Bellman-Ford, Floyd-Warshall). Traversals for DGs. Parenthesis Lemma. DAGs. Topological Sort		
7	Undirected Graphs. Terminology. Free Trees. Graph Representations. Graph Traversals (depth-first, breadth-first). Articulation points & Biconnected Components.		
8	Algorithm Design Techniques I. Brute Force Algorithms. Greedy Algorithms.		
9	Algorithm Design Techniques I. Divide-and-Conquer.		
10	Algorithm Design Techniques II. Dynamic Programming.		
11	Algorithm Design Techniques III. Backtracking. Search Tree Strategies (branch and bound)		
12	Algorithm Design Techniques IV. Search Tree Strategies (branch and bound). Local Search.		

13	Internal Sorting		
14	Review		

Bibliography

1. Aho, Hopcroft, Ullman. Data Structures and Algorithms, Addison-Wesley, 427 pages, 1987.
2. Cormen, Leiserson, Rivest, Stein: Introduction to Algorithms, 2nd edition. MIT Press / McGraw Hill, 1028 pages, 2001.
3. Preiss, Bruno. Data Structures and Algorithms with object-Oriented Design Patterns in C++, John Wiley and Sons, 660 pages, 1999 (freely available on the Web)

8.2. Applications (Laboratory)		Teaching methods	Notes
1	Review of C Programming.	Tutoring, discussions, and assisted program development	PCs equipped with MinGW C and Code-blocks IDE
2	Singly-linked Lists, Stacks and Queues.(Array-based and Dynamic Allocation Implementations)		
3	Doubly Linked and Circular Lists		
4	Arbitrary Trees. Binary Trees		
5	Binary Search Trees		
6	Hash Tables.		
	Laboratory Test 1		
7	Graph Representations and Traversals (BFS, DFS and applications)		
8	Algorithm Design I. Greedy		
9	Algorithm Design II. Divide & Conquer		
10	Algorithm Design III. Dynamic Programming and Heuristics.		
11	Algorithm Design IV Backtracking and Branch and Bound		
12	Review. Evaluation of extra-credit problems		
	Laboratory Test 2		

Bibliography

1. Moodle course Web Site 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

The contents of the course is in accordance with the ACM Computer Science Curricula recommendations.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		The understanding of the concepts taught and the ability to solve problems		Three in-class tests (T) + Final Written exam (W)		65% = 50% W + 15% T
Applications		Quality of the assigned applications		Analysis and evaluation of the solved assignments		35%
10.4 Minimum standard of performance						
Correct solutions for min. 60% of the exam topics and applications						

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

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	13.

2. Data about the subject

2.1	Subject name					Foreign Language II (English, French, German)					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					-					
2.4	Teachers in charge of applications					Conf.dr. Sonia Munteanu – Sonia.Munteanu@lang.utcluj.ro Lect. dr. Mona Tripon Mona.Tripon@lang.utcluj.ro Asist.dr. Monica Negoescu, Negoescu@mail.utcluj.ro					
2.5	Year of study	I	2.6	Semester	2	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			
2	**Foreign Language II (English, French, German)**	**-**	**2**	**-**	**-**	**-**	**28**	**-**	**-**	**22**	**50**	**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								
Supplementary study in the library, online and in the field								
Preparation for seminars/laboratory works, homework, reports, portfolios, essays								22
Tutoring								
Exams and tests								
Other activities								

3.7	Total hours of individual study	22
3.8	Total hours per semester	50
3.9	Number of credit points	2

4. Pre-requisites (where appropriate)

4.1	Curriculum	Completion of FL_I seminar
4.2	Competence	Minimum B2 level (CEFR)

5. Requirements (where appropriate)

5.1	For the course	N/A
5.2	For the applications	Class attendance, individual study and homework completion

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	Students should acquire knowledge and integrated skills to communicate in a foreign language in professional (technical and engineering) contexts and on job related topics.
7.2	Specific objectives	At the end of this seminar, the students will be able to: - Organize information for oral presentation; - Evaluate audience and adapt spoken discourse to current informational and linguistic needs; - Prepare and deliver a short presentation on a work/professional/own interest related topic; - Use linguistic and paralinguistic means to various purposes and needs within their field of interest or profession.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	-		
Bibliography			
8.2. Applications (Seminars)		Teaching methods	Notes
1	Describing purpose of communication in work/professional related contexts; understanding and differentiating informative talks, persuasive talks, descriptive and argumentative talks.	presentation of content, viewing professional presentations and observing structure and approach, case-based discussion, peer evaluation, small projects-based learning	
2	Assessing, predicting and describing audience needs and expectations.		
3	Formulating and prioritizing communicative goals: relating to audience expectations.		
4	Organizing information and structuring ideas: leading information vs details, supporting info and exemplifying, supplementary info. Introduction, body conclusion Q&A presentation format.		
5	Preparing for speaking to an audience: introducing self, purpose of talk, previewing info and stating policy on questions.		
6	Controlling voice and spoken production: prosody of language: word and sentence stress, pace, rhythm and intonation.		
7	Using language to make an impact: parallel structures, tripling, cumulative structures; coordination with voice and body language.		
8	Preparing visual aid: PP slides – dos and donts; technical visual support (graphs, tables, etc.).		
9	Introducing, describing and interpreting visual support data: talking about numerical data, describing trends in graphs/tables, summarizing and/or pointing to relevant numerical values/data.		
10	Presenting narrative data. Sequence markers and syntactic connectors. Transitional devices, discourse markers.		
11	Drawing a powerful conclusion: recapping main points, concluding, home-		

	take messages.		
12	Inviting questions, managing rapport, expressing opinion, attitude.		
13	Formal vs informal language – politeness in a foreign language. Using humor, irony and personal anecdote to convey subtle meanings and gain audience support.		
14	Students' presentations		

Bibliography

1. Adrian Wallwork (2010), English for Presentations at International Conferences, Springer.
2. Andrew Bradbury (2006) Successful Presentation Skills, Kogan Page, London.
3. Angela M. Thody (2006) Writing and Presenting Research, Sage Publications.
4. Powell, M. (1998) Presenting in English (2nd edition), LTP, London.
5. Grussendorf, M. (2011) Oxford English for Presentations, Express series. OUP.

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 of study, making informed decisions on various types of information, and keeping up-to-date with state of the art knowledge in students' professional field.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course						
Applications		Completion of tasks in class activities, homework or individual study solving, attendance to seminars, delivering own presentation.		On-going class-work evaluation; Rubric-based evaluation of students' presentation		Class-work evaluation – 30% Own presentation 70%
10.4 Minimum standard of performance						
at least 50% of all components of tasks solved correctly						

Teachers in charge of applications
Conf.dr. Sonia Munteanu
Lect.dr. Mona Tripon
Asist.dr. Monica Negoescu

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	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	14.

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					-					
2.4	Teachers in charge of applications					As.dr. Adrian Suciu					
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**	**-**	**-**	**22**	**50**	**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	-
Supplementary study in the library, online and in the field	20
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	-
Tutoring	-
Exams and tests	2
Other activities	-

3.7	Total hours of individual study	22
3.8	Total hours per semester	50
3.9	Number of credit points	2

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		100%
10.4 Minimum standard of performance						
Fulfilling the criteria of evaluation with emphasis on active participation in class, advancements, sports skills.						

Course responsible
As.dr. Adrian Suciu

Head of department
Prof.dr.eng. Rodica Potolea