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	16.

2. Data about the subject

2.1	Subject name					Electronic Measurements and Sensors					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Assoc. Professor Rodica Holonec					
2.4	Teachers in charge of applications					S.Lecturer Septimiu Crisan, J. Lecturer Valentin Zaharia					
2.5	Year of study	II	2.6	Semester	3	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			
3	**Electronic Measurements and Sensors**	**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	3
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	20
Tutoring	2
Exams and tests	3
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	
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 (2 credits) **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 **C1.5 –** Providing a theoretical background for the characteristics of the designed systems **C1.4 –** Formal evaluation of the functional and non-functional characteristics of computing systems **C2 –** Designing hardware, software and communication components (2 credits)

	C2.1 – Describing the structure and functioning of computational, communication and software components and systems **C2.4 –** Evaluating the functional and non-functional characteristics of the computing systems using specific metrics
Cross competences	N/A

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

7.1	General objective	The students will gain the knowledge about: - Instrumentation and sensors systems - the working and operation of various electrical and electronic instruments - the electrical measurement methods, - principles and applications of different types of sensors
7.2	Specific objectives	

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Measurement fundamentals. Terms and definitions. The structure of a complex instrumentation system. Sensors	Exposure Discussions	Projector
2	Fundamentals of Metrology. Measurement Units. Measurements Standards. Traceability. Measurement terminology. Errors and Uncertainties. The Measuring Instrument Specifications.		
3	Random Errors Analysis. Basic Concepts in Probability. Normal Distribution. Central Limit Theorem. The Evaluation of Uncertainties in Measurements		
4	Meters. Analog Meters-Classifications and Symbols. Types of Analog Instruments. Voltmeters. Ammeters. Wattmeters, Ohmmeters		
5	Measurements with Bridges and Potentiometers. Wheatstone Bridge. Principle. Applications. Types of AC bridges. Potentiometers.		
6	Amplification in Instrumentation. Operational Amplifiers. Basic circuits. Instrumentation Amplifiers. Current to Voltage, Resistance to Voltage Converters. Bridge Amplifiers.		
7	Electronic Voltmeters. DC Electronic Voltmeters. Types of AC Electronic Voltmeters. Lock-in Amplifiers. Principles and Applications		
8	Electronic Counters. Digital measurement of frequency and time		
9	Digital Multimeters. Computing Measuring Systems. Data Acquisition Boards. Sample and Hold Circuits. Nyquist theorem.		
10	Data Acquisition Boards Components. Digital to Analog Converters. Analog to Digital Converters. Virtual Instruments		
11	Power Measurement. Definitions. DC and AC Power Measurements. Digital Wattmeters		
12	The Analog and Digital Oscilloscopes		
13	Transducers, Sensors and Actuators. Principles and Classifications. Analog and digital Sensors.		
14	Position sensors. Temperature sensors. Light sensors.		

Bibliography

1. Rodica Holonec, ***Electrical Measurements and Instrumentation***, Editura Mediamira, Cluj-Napoca, 2003, 259 p, ISBN 973-9357-42-3
2. Todoran,Gh.,Copandean,R; ***Masurari Electrice si Electronice***.Editura Mediamira; Cluj Napoca. 2003. 282p. ISBN 973-9357-61-X.
3. Dragomir, N.D., TÂRNOVAN, I.G., Crişan, T.E. – ***Electrical Measurement of Non Electric Quantities. Vol. I***. Editura MEDIAMIRA, Cluj-Napoca, România, 2002. ISBN 973-9358-75-6.
4. TÂRNOVAN,I.G**.** – ***Metrologie electrică şi instrumentaţie***. Editura MEDIAMIRA, Cluj-Napoca, România, 2003. ISBN 973-9357-39-3.

5. Munteanu,R., TÂRNOVAN,I.G., Dragomir,N.D., Popovici,O. – ***Electrotehnică şi convertoare energetice***. Editura MEDIAMIRA, Cluj-Napoca, România, 1997.			
8.2. Applications (Laboratory,)		Teaching methods	Notes
1	Utilization of analogue and digital measurement instruments	Exposure applications	Experimental circuits, Computer LabView software, NI hardware
2	Measurement range extending of analogue instruments		
3	Voltammetric method for measurement of electrical circuit parameters		
4	Power measurement in monophasic alternate current		
5	RPM measurement		
6	Temperature measurements and control		
7	Photometric quantities measurement		
8	Study of graphical programming language LabVIEW		
9	Data acquisition with multifunctional boards		
10	Generation of analogue and digital signals with data acquisition boards		
11	Measurement with PC integrated instruments		
12	Study of digital oscilloscope Tektronix TDS 460A		
13	Study of functions generator Tektronix AFG 320		
14	Final assessment of laboratory reports		
Bibliography 1. Munteanu,R., Dragomir,N.D., TÂRNOVAN,I.G**.,** Holonec,Rodica, Bortoş,P. – *Tehnici de măsurare. Îndrumător de laborator*. Atelierul de multiplicare al U.T.C.-N., 1995. 2. http://users.utcluj.ro/~tarnovan/Electronic%20Measurements%20and%20Sensors.htm			

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

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

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Final exam (E)-Theoretical questions and exercises (3 hours)		Written examination		80%
Applications		Practical circuit (P)		Checking of functionality		10%
		Homework (HW)		Verification of results		10%
10.4 Minimum standard of performance						
G=(E+P+HW)/100; Condition to take the credits: G≥5;						

Course responsible
Assoc. Professor Rodica Holonec

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	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	17.

2. Data about the subject

2.1	Subject name					Numerical 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. dr. Mircia GURZAU, Assoc. prof. dr. Daniela ROSCA					
2.5	Year of study	II	2.6	Semester	3	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			
3	**Numerical Calculus**	**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	30
Supplementary study in the library, online and in the field	9
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	30
Tutoring	0
Exams and tests	3
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	Basic knowledge of Differential and Integral Calculus
4.2	Competence	Competences in elementary Differential and Integral Calculus: derivatives, integrals, series.

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 (5 credits) **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.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	**Elements of Error Theory.** Floating Point Arithmetic. Absolute and Relative Errors.	Explanation	2 hr
2-3	**Numerical Methods in Linear Algebra.** Special Types of Matrices. Norms of Vectors and Matrices. Eigenvalues and Eigenvectors. Error Estimation. Matrix Equations. Pivoting Elimination. Improved Solutions of Matrix Equations. Partitioning Methods for Matrix Inversion. LU Factorization. Doolittle's Factorization. Choleski's Factorization Method. Iterative Techniques for Solving Linear Systems. Jacobi Iterative Method. Gauss-Seidel Iterative Method. Relaxation Methods. Characteristic Polynomial: Leverrier Method. Characteristic Polynomial: Fadeev-Frame Method.	Demonstration Collaboration Interactive activities	4 hr
4-5	**Solutions of Nonlinear Equations.** Method of Successive Approximation. The Bisection Method. The Newton-Raphson Method. The Secant Method. False Position Method. The Chebyshev Method. Numerical Solutions of Nonlinear Systems of Equations. Newton's Method for Systems of Nonlinear Equations. Steepest Descent Method.		4 hr
6-8	**Elements of Interpolation Theory.** Lagrange Interpolation. Divided Difference. Mean Value Properties in Lagrange Interpolation. Approximation by Interpolation. Hermite Interpolating Polynomial. Finite Differences. Interpolation of Multivariable Functions. Scattered Data Interpolation. Shepard's Method. Splines. B-splines.		6 hr
9-10	**Elements of Numerical Integration.** Richardson's Extrapolation. Numerical Quadrature. Error Bounds in the Quadrature Methods. Trapezoidal Rule. Richardson's Deferred Approach to the Limit. Romberg Integration. Newton-Cotes Formulas. Simpson's Rule. Gaussian Quadrature.		4 hr
11-12	**Elements of Approximation Theory.** Discrete Least Squares Approximation. Orthogonal Polynomials and Least Squares Approximation. Rational Function Approximation. Padé Approximation. Trigonometric Polynomial Approximation. Fast Fourier Transform. Bernstein Polynomial. Bézier Curves. *METAFONT*.		4 hr
13-14	**Integration of Ordinary/Partial Differential Equations.** The Euler Method. The Taylor Series Method. The Runge-Kutta Method. The Runge-Kutta Method for Systems of Equations. **Integration of Partial Differential Equations** Parabolic Partial-Differential Equations. Hyperbolic Partial Differential Equations. Elliptic Partial Differential Equations.		4 hr

Bibliography

1. Dumitru Mircea Ivan. Calculus. Editura Mediamira, Cluj-Napoca, 2002. ISBN 973-9358-88-8.
2. Mircea Ivan and Kálmán Pusztai. Numerical Methods with Mathematica. Mediamira, Cluj-Napoca, 2003. ISBN 973-9357-41-5.
3. Ioan-Adrian Viorel, Dumitru Mircea Ivan, and Loránd Szabó. Metode numerice cu aplicaţii în ingineria electrică. Editura Universităţii din Oradea,
4. Mircea Ivan and Kálmán Pusztai. Mathematics by Computer. Comprex Publishing House, Cluj-Napoca, 1992.

8.2. Applications (Laboratory)		Teaching methods	Notes
1	The applications follow the topics of the courses.	Explanation Demonstration	28 hr

		Collaboration Interactive activities	

Bibliography:

1. Mircea Ivan and Kálmán Pusztai. Numerical Methods with Mathematica. Mediamira, Cluj-Napoca, 2003. ISBN 973-9357-41-5.
2. Ioan-Adrian Viorel, Dumitru Mircea Ivan, and Loránd Szabó. Metode numerice cu aplicaţii în ingineria electrică. Editura Universităţii din Oradea,

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	18.

2. Data about the subject

2.1	Subject name					Analog and digital circuits					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Prof. dr. eng. Dădârlat Vasile Teodor – Vasile.Dadarlat@cs.utcluj.ro					
2.4	Teachers in charge of applications					Sl. dr. eng. Peculea Adrian – Adrian.Peculea@cs.utcluj.ro Sl. dr. eng. Iancu Bogdan – Bogdan.Iancu@cs.utcluj.ro					
2.5	Year of study	II	2.6	Semester	3	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			
3	**Analog and digital circuits**	**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	40
Supplementary study in the library, online and in the field	10
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	24
Tutoring	
Exams and tests	
Other activities	

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	Basic knowledge in Physics, Electronics, Mathematics

5. Requirements (where appropriate)

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

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

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Introduction. Electrical signals, passive devices, linear circuits behavior at elementary signals application.	Oral Presentations using multimedia means Q & A Interactive teaching	
2	Semiconductor devices (I). Semiconductor, Schottky, Zener and light emitting diode.		
3	Semiconductor devices (II). Bipolar and field effect transistor.		
4	Operational amplifiers. Characteristics, circuits with operational amplifiers with negative feedback.		
5	DC power supplies. Rectifiers, filters. Parametric, feedback and integrated voltage regulators. Oscillators. Positive feedback, oscillator circuits.		
6	Integrated logic circuit parameters. Static transfer characteristics, noise margins, fan-in and fan-out, propagation time, power dissipation.		
7	Integrated logic circuit families (I). TTL integrated logic circuits.		
8	Integrated logic circuit families (II). NMOS, CMOS and HCT integrated logic circuits.		
9	Bus building with logic circuits. Open collector and three state integrated logic circuits, connecting circuits to buses, transfer between registers and three state logic.		
10	Positive feedback circuits (I). Schmitt trigger and flip-flop circuits.		
11	Positive feedback circuits (II). Monostable and astable circuits.		
12	Semiconductor memories. Volatile and non-volatile semiconductor memories.		
13	Converters. Sampling, signal quantization, analog to digital and digital to analog converters.		
14	Microcontrollers. Architecture, memory addressing, interrupt and timer system, serial communication.		

Bibliography

1. Vasile Teodor Dadarlat, Adrian Peculea, „Circuite analogice si numerice”, Ed. U.T.PRES, Cluj-Napoca, 2006, ISBN (10) 973-662-243-6 ISBN (13) 978-973-662-243-4.

8.2. Applications (Laboratory)		Teaching methods	Notes
1	Electrical signals and liner circuits.	Practical exercises Brief presentation of possible solutions Self testing programmes	
2	Semiconductor, Schottky, Zener and light emitting diode.		
3	Bipolar and field effect transistor.		
4	Circuits with passive and semiconductor devices.		
5	Circuits with operational amplifiers with negative feedback.		
6	Rectifiers, filters and regulators.		
7	Oscillator circuits.		
8	Bipolar integrated logic circuits.		
9	MOS integrated logic circuits.		

10	Open collector integrated logic circuits.		
11	Three state integrated logic circuits.		
12	Schmitt trigger circuits.		
13	Multivibrator circuits.		
14	Laboratory test		

Bibliography

1. Slides for Analog an digital circuits courses + sets of problems and applications for individual study at ftp://ftp.utcluj.ro/pub/users/dadarlat/circ_analognumeric-calc

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

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

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Interactivity and initial preparation		Written exam (2,5 h).		70%
Applications		Quality of practical work, participation		Continuous assessment, final written colloquium		30%
10.4 Minimum standard of performance						
Grades > 5 for both theoretical and practical assessments						

Course responsible
Prof. dr. eng. Vasile Dădârlat

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	19.

2. Data about the subject

2.1	Subject name					Object Oriented Programming					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					As. dr. eng. Marius Joldoş – Marius.Joldos@cs.utcluj.ro					
2.4	Teachers in charge of applications					As.dr. eng. Ion Giosan – Ion.Giosan@cs.utcluj.ro As.drd. eng. Ciprian Pocol – Ciprian.Pocol@cs.utcluj.ro					
2.5	Year of study	II	2.6	Semester	3	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			
3	**Object Oriented 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	Computer Programming course
4.2	Competence	Use of a procedural programming language such as C

5. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications	

6. Specific competences

Professional competences	**C2 –** Designing hardware, software and communication components (5 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

Cross competences	N/A

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

7.1	General objective	To learn a rigorous treatment of object-oriented concepts using Java as an example language
7.2	Specific objectives	• to prepare object-oriented design for small/medium scale problems • to demonstrate the differences between traditional imperative design and object-oriented design • to explain class structures as fundamental, modular building blocks • to understand the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code • to write small/medium scale Java programs with simple graphical user interface • to use classes written by other programmers when constructing their systems • to be able to design and build simple Graphical User Interfaces (GUI)s.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Concepts and paradigms in OOP	Lectures, demos and discussions	Uses a video-projector
2	Abstractions and Abstract Data Types. On to Java		
3	Control structures in Java. Classes and Objects		
4	Classes and Objects. Arrays		
5	Java Interfaces. Packages		
6	Inheritance and polymorphism. Classes Object and Class		
7	OO Application Development. UML Object and Class Diagrams. Assertions. Midterm		
8	Testing. Debugging. Java Errors and Exceptions		
9	Inner Classes. Event handling in Java. Introduction to Java Graphics		
10	Graphical User Interfaces		
11	Applets. Java Collections		
12	Introduction to Java I/O		
13	More Java I/O. Introduction to Threads		
14	Review		

Bibliography

1. Bruce Eckel, Thinking in Java, Third Edition, Prentice Hall PTR, 2002 (downloadable for free from the Web).
2. Paul & Harvey Deitel, Java. How to Program, Ninth Edition, Prentice Hall, 2012
3. David J. Barnes & Michael Kölling, Objects First with Java. A Practical Introduction using BlueJ, Fifth Edition, Prentice Hall / Pearson Education, 2012
4. Oracle Java Tutorials (freely downloadable from the Web)
5. Schmuller Joseph, SAMS teach yourself UML in 24 hours, 2004

8.2. Applications (Laboratory)		Teaching methods	Notes
1	Using BlueJ IDE	Tutoring, discussions, and assisted program development	PCs equipped with Java SDK and IDEs (BlueJ, Eclipse, Netbeans)
2	Primitive Types and Simple IO in Java		
3	Variables and Expressions in Java		
4	Flow Control and Simple Classes in Java		
5	Classes, Objects and Arrays		
6	Java Interfaces		
7	Java Inheritance		
8	Java Exception Handling. Miniproject Assigned		
9	Event Handling		
10	Keyboard and Mouse Handling		
11	Applets		

12	Work for the Miniproject Assignment		
13	Work for the Miniproject Assignment		
14	Laboratory test		
Bibliography 1. Course Moodle site available at: https://193.226.5.110			

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		Ability to solve problems using the object orientated paradigm		Written exam		60%
Applications		Quality of laboratory applications and of the miniproject		Specifications and code analysis and evaluation		40%
10.4 Minimum standard of performance						
Correct solutions for min. 60% of the exam topics and applications						

Course responsible
As. dr. eng. Marius Joldoş

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	20.

2. Data about the subject

2.1	Subject name					DataBase					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					As. dr. eng. Călin Cenan – Calin.Cenan@cs.utcluj.ro					
2.4	Teachers in charge of applications					Sl. dr. eng. Delia Mitrea – Delia.Mitrea@cs.utcluj.ro					
2.5	Year of study	II	2.6	Semester	3	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			
3	**DataBase**	**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	21
Supplementary study in the library, online and in the field	28
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	21
Tutoring	1
Exams and tests	3
Other activities	

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	Mathematics
4.2	Competence	Set theory

5. Requirements (where appropriate)

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

6. Specific competences

Professional competences	**C4** - Improving the performances of the hardware, software and communication systems **C4.1** - Identifying and describing the defining elements of the performances of the hardware, software and communication systems **C4.2** - Explaining the interaction of the factors that determine the performances of the hardware, software and communication systems **C4.3** - Applying the fundamental methods and principles for increasing the performances of the hardware, software and communication systems

	C4.4 - Choosing the criteria and evaluation methods of the performances of the hardware, software and communication systems **C4.5** - Developing professional solutions for hardware, software and communication systems based on performance optimization
Cross competences	N/A

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

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

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Introduction. Database, Database Management Systems	PDF & PPT Presentations; Demonstrations and model presentations on board; small exercises to increase interaction	
2	Database Management Systems Architecture		
3	Entity – Relation Model		
4	Relational Model		
5	Database Design; Optimization, Normal forms		
6	Entities; Relations; Constraints; Views (II)		
7	Physical database design		
8	Indexes		
9	Relational Algebra		
10	Relational Calculus		
11	Query by example		
12	Structured Query Language – SQL		
13	Database administration; Security		
14	Database Applications		

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1. Alexandru Leluțiu - *Perenitatea Concepteleor Promovate de BAZELE de DATE*, Ed. Albastra, 2003
2. Raghu Ramakrishnan and Johannes Gehrke - *Database Management Systems*, McGraw-Hill Science, 2002
3. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom - *First Course in Database Systems*, Prentice Hall, 2001
4. P. O'Neil, E. O'Neil - *DATABSE Principles, Programming and Performance*, Academic Press Morgan Kaufmann, 1994
5. Philip Greenspun - *SQL for Web Nerds*, http://philip.greenspun.com/sql/
6. Ryan K. Stephens, Ronald R. Plew, - *Teach Yourself SQL in 21 Days*, Prentice Hall, 1999

8.2. Applications (Laboratory)		Teaching methods	Notes
1	Microsoft SQL Server presentation	Exposure and applications	Computers, MS SQL Server, MySQL, Apache Web Server, PHP
2	MS SQL Server administration		
3	Tables; Relationships; Database diagrams		
4	Indexes; Constraints; Views		
5	INSERT, UPDATE, DELETE		
6	Structured Query Language – SQL – Simple SELECT		
7	Structured Query Language – SQL – Advanced SELECT		
8	Web Database Applications: Architecture		
9	Web Database Applications: Languages		
10	Examples of Web Database Applications		

11	Project Work – Web Database Applications 1		
12	Project Work – Web Database Applications 2 – Mid Evaluation		
13	Project Work – Web Database Applications 3		
14	Final laboratory and project work evaluation		

Bibliography

1. Raghu Ramakrishnan and Johannes Gehrke - *Database Management Systems*, McGraw-Hill Science, 2002
2. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom - *First Course in Database Systems*, Prentice Hall, 2001
3. Philip Greenspun - *SQL for Web Nerds*, http://philip.greenspun.com/sql/
4. Ryan K. Stephens, Ronald R. Plew, - *Teach Yourself SQL in 21 Days*, Prentice Hall, 1999

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

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

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Solving 4 problems and answers to questions of theory		2.5 hours written evaluation		60%
Applications		Implementarea unei aplicatii		Ongoing evaluation and a final presentation		40%

10.4 Minimum standard of performance

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

Course responsible
As. dr. eng. Calin Cenan

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	21.

2. 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					
2.4	Teachers in charge of applications										
2.5	Year of study	II	2.6	Semester	3	2.7	Assessment	exam	2.8	Subject category	DS/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			
3	**Assembly Language 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	24
Supplementary study in the library, online and in the field	24
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	22
Tutoring	2
Exams and tests	2
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	None
4.2	Competence	None

5. 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

6. 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

	C3 Problems solving using specific Computer Science and Computer Engineering tools (3 credits) **C3.1** Identifying classes of problems and solving methods that are specific to computing systems **C3.2** Using interdisciplinary knowledge, solution patterns and tools, making experiments and interpreting their results **C3.3** Applying solution patterns using specific engineering tools and methods **C3.4** Evaluating, comparatively and experimentally, the available alternative solutions for performance optimization **C3.5** Developing and implementing software solutions for given problems
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. R. Hyde R. Hyde, "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
Assoc. Prof. dr. eng. 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	22.

2. Data about the subject

2.1	Subject name					Foreign Language I (English, French - Technical documents elaboration)					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Assoc. prof. dr Marinela Granescu granescu@lang.utcluj.ro					
2.4	Teachers in charge of applications					-					
2.5	Year of study	II	2.6	Semester	3	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			
3	**Foreign Language I (English, French - Technical documents elaboration)**	**2**	**-**	**-**	**-**	**28**	**-**	**-**	**-**	**-**	**28**	**1**

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

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	B1 according to the Common European Framework for Languages
4.2	Competence	Continuous education

5. Requirements (where appropriate)

5.1	For the course	Study of research articles
5.2	For the applications	

6. Specific competences

Professional competences	N/A

Cross competences	**CT3 –** Demonstrating the spirit of initiative and action for updating professional, economical and organizational culture knowledge (1 credit)

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	- Forming and developing the skill of searching and using correctly information sources specific of academic and/or research study - Improvement of writing skill

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Importance of professional communication	Lecture, conversation, slides, format awareness raising, writing exercises	
2	Professional and academic communication		
3	The writing process of a technical document. Identification and use of best printed and electronic sources.		
4	Drafting. Editing. Grammar rules and conventions.		
5	The sentence and the paragraph. Punctuation and spelling.		
6	Language functions: definitions, exemplification, contrast and comparison, cause and effect, description, instructions		
7	Document writing conventions. Legal and ethical aspects regarding academic writing		
8	Avoiding plagiarism. Paraphrase. Reference sources		
9	Editing and improving documents. Text reduction techniques		
10	Synthesis, summary, report		
11	Types of technical documents.		
12	Official letters.		
13	British and American English		
14	Final test		

Bibliography

1. Granescu, M., Adam, E., *Effective Academic and Technical Writing*, UTPress, Cluj-Napoca, 2009
2. Munteanu, S.C. (2002) *Academic Writing for Engineering Students*, Ed. GenesisTipo, Cluj Napoca, 2002,
3. *** (2001) *Students' English Grammar*, UTPress, Cluj-Napoca, 2001
4. Quirk, R. *A Grammar of English*, OUP. , 1998
5. Hutchin, N. Thomas, Leslie A. Olsen, *Technical Writing & Professional Communication for Nonnative Speakers Of English*, Ed. McGraw Hill Inc. 1991
6. Ioani Monica, Granescu Marinela, Vlaicu Rodica, *Tehnici de comunicare pentru ingineri*, U.T. Pres, 2002
7. Research articles

8.2. Applications (Seminars, Laboratory, Projects)		Teaching methods	Notes
1	-		

Bibliography

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

Improving the skills of writing research and engineering texts in English will contribute to increasing employability opportunity with companies using foreign languages as a communication means.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course						
Applications		Ability to answer questions in the format of a short sized text, where layout, language and discourse structures are correctly used.		Final written test + assignments		50%+50%

10.4 Minimum standard of performance
Minimum 60% of the final test, regarding language, lexical and discourse structures used in the technical discourse, linking words, verbs in impersonal moods, nominal groups, revision and correction of written texts

Course responsible
Assoc. prof. dr Marinela Granescu

Head of department
Prof.dr.eng. Rodica Potolea