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, Phd eng					
2.4	Teachers in charge of applications					Lecturer Septimiu Crisan, Phd eng					
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	Basic Electrical circuit theory, Basic Electronics, Analysis methods for electronic circuits; General Physics

5. Requirements (where appropriate)

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

6. Specific 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 **C1.4 –** 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 **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 operation of hardware, software and communication components **C2.3 –** Construction of hardware and software components of computing systems using design methods, languages, algorithms, data structures, protocols and technologies **C2.4 –** Evaluating the functional and non-functional characteristics of the computing systems using specific metrics **C2.5 –** Implementation of hardware, software and communication components
Cross competences	N/A

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

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

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Measurement fundamentals. Terms and definitions. The structure of a complex instrumentation system. Sensors	Presentation, heuristic conversation, exemplification , problem presentation, teaching exercise, case study, formative evaluation	Projector, blackboard
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. Strain gauge measurement bridges. 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 Multi-meters (DMM). 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	The Analog and Digital Oscilloscopes		
12	Transducers, Sensors and Actuators. Terminology. Principles and Classifications. Analog and Digital Sensors.		
13	Analog Sensors. Potentiometers. Variable-Inductance and Capacitance Sensors. Temperature sensors.		
14	Digital sensors. Encoders. Optical Sensors: Fiber-Optic 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.
6. http://users.utcluj.ro/~tarnovan/Electronic%20Measurements%20and%20Sensors.htm

8.2. Applications (Seminars, Laboratory, Projects)		Teaching methods	Notes
1	Analog and Digital Measurement Devices	Exposure applications	Experimental circuits, Computer LabView software, NI hardware
2	Domain Extension of Analog Measurement Instruments		
3	Single-phased A.C. Circuits Measurements		
4	The Wheatstone Bridge		
5	The Oscilloscope. Basics and Measuring Principles		
6	Virtual Instrumentation: LabView - Basic Operations		
7	Virtual Instrumentation applications		
8	Data Acquisition Systems: Single Sample Acquisition Mode		
9	Data Acquisition Systems. Signal Processing Applications		
10	Temperature Measurement		
11	Level and Flow Measurement		
12	Displacement Measurement		
13	Angular Speed Measurement		
14	Final Assessment of Laboratory Reports		

Bibliography

1. Rodica Holonec, B. Tebrean, I.G. Tarnovan, Gh. Todoran, Electronic Measurements: Laboratory Manual Editura U.T. PRESS, Cluj-Napoca 2010, ISBN.978-973-662-600
2. Munteanu,R., Dragomir,N.D., TÂRNOVAN,I.G., Holonec,Rodica, Bortoş,P. – Tehnici de măsurare. Îndrumător de laborator. Atelierul de multiplicare al U.T.C.-N., 1995.

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

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

10. Evaluation

Activity type	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.Prof. Rodica Holonec, PhD eng

Head of department
Prof. Rodica Potolea, PhD eng

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 – mircea.ivan@math.utcluj.ro					
2.4	Teachers in charge of applications					Prof. dr. Daniela Rosca – daniela.rosca@math.utcluj.ro S.l. Mircia Gurzau – mircia@gurzau@math.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	**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 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 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 Demonstration Collaboration Interactive activities	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.		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.		4 hr

	Hyperbolic Partial Differential Equations. Elliptic Partial Differential Equations.		

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 (Seminars, Laboratory, Projects)		Teaching methods	Notes
1	The applications follow the topics of the courses.	Explanation Demonstration Collaboration Interactive activities	28 hr

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					Conf. 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	
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.	possible solutions Self testing programmes	
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, intermediary and final written examinations		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					S.l. dr. eng. Marius Joldoş – Marius.Joldos@cs.utcluj.ro					
2.4	Teachers in charge of applications					Eng. Giuroiu Titus-Nicolae, MS − titus.giuroiu@gmail.com Eng. Bondor Alexandru Viorel − alexandru.viorel.bondor@gmail.com					
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 **C2.4 -** Metric based evaluation of functional and non-functional characteristics of computing systems **C2.5 -** Implementation of hardware, software and communication components
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. On to Java	Lectures, demos and discussions	Uses a video-projector
2	Control structures in Java.		
3	Classes and Objects. Arrays		
4	Packages. Inheritance and polymorphism.		
5	Java Interfaces. OO Application Development		
6	UML Object and Class Diagrams. Assertions.		
7	Testing. Debugging. Java Errors and Exceptions		
8	Java Collections. Generic Programming.		
9	Introduction to Java I/O		
10	Event handling in Java. Introduction to Java Graphics		
11	Graphical User Interfaces (I)		
12	Introduction to Threads		
13	Graphical User Interfaces (II)		
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 (Early Objects), Tenth Edition, Prentice Hall, 2015
3. David J. Barnes & Michael Kölling, Objects First with Java. A Practical Introduction using BlueJ, Fifth Edition, Prentice Hall / Pearson Education, 2012
4. Oracle Java Tutorials (freely downloadable from the Web)
5. Schmuller Joseph, SAMS teach yourself UML in 24 hours, 2004

8.2. Applications (Seminars, Laboratory, Projects)		Teaching methods	Notes
1	Using BlueJ IDE	Tutoring, discussions, and assisted program development	PCs equipped with Java SDK and
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 Inheritance		

7	Java Interfaces		IDEs (BlueJ, Eclipse, Netbeans)
8	**Laboratory test 1**		
9	Java Exception Handling.		
10	Collections		
11	Testing OOP programs		
12	GUIs. Event Handling		
13	GUIs. Keyboard and Mouse Handling		
14	**Laboratory test 2**		
Bibliography 1. Course Moodle 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 Java programming language is the most widely used language.

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 exams: In-class tests Final		 10% 50%
Applications		Quality of laboratory applications and evaluation of the laboratory tests		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
S.l. dr. eng. Marius Joldoş

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	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					S.l. dr. eng. Călin Cenan – Calin.Cenan@cs.utcluj.ro					
2.4	Teachers in charge of applications					Conf. 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		

Bibliography

1. Alexandru Leluţiu - *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
2	MS SQL Server administration		
3	MS SQL Server databases: Tables; Relationships; Database diagrams		
4	MS SQL Server databases: Indexes; Constraints; Views		

5	MS SQL Server databases: INSERT, UPDATE, DELETE		Server, MySQL, Apache Web Server, PHP
6	Structured Query Language – SQL – Simple SELECT		
7	Structured Query Language – SQL – Advanced SELECT		
8	MySQL presentation; MySQL administration		
9	MySQL databases		
10	Examples of Web Database Applications		
11	Database design – simple examples		
12	Database design – more complex examples		
13	Project Work – Web Database Applications		
14	Final laboratory 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 problems and answers to theoretical questions		2.5 hours written evaluation		60% (a grade greater than 5 is mandatory)
Applications		Presenting databases implemented in 2 different DBMS; Knowing Structured Query Language Project Work: Web Database Applications		Ongoing evaluation Final presentation		30% (a grade greater than 5 is mandatory) 10%

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
S.l.dr.ing. Calin Cenan

Head of department
Prof.dr.eng. Rodica Potolea

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1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Computer Science/ Engineer
1.7	Form of education	Full time
1.8	Subject code	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- 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

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, DOSBox

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
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

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1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Computer Science/ Engineer
1.7	Form of education	Full time
1.8	Subject code	22.

2. Data about the subject

2.1	Subject name					Foreign Language I (English, French, German - Technical documents elaboration)					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Conf.univ.dr. Sonia Munteanu					
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, German - 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	Foreign language seminars I, II
4.2	Competence	English language competence, B2 level in CEFRL

5. Requirements (where appropriate)

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

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Hierarchical structure of grammar. Natural language processing; morphology, syntax, discourse. Language knowledge in technology development for language processing and artificial intelligence.	lecture, problem-based learning, case–study, small group discussions and task solving, assignment discussion	
2	Student's research on NLP and AI topics which involve knowledge about language. Assignment discussion		
3	Word structure: inflected and derivate words. Derivation as a means of creating technical vocabulary.		
4	Phrases: noun headed phrases, verb headed phrases, adjective headed phrases, and preposition headed phrases.		
5	Simple and complex sentences. Frequently used phrase/sentence structures in technical texts: coordination and subordination in finite and non-finite clauses.		
6	Cohesion and coherence in discourse: syntactic parallelism, sentence rephrase, nominalization, lexical choice, emphasis.		
7	Structure of information in paragraphs: general-particular patterns, theme-rheme, hypothesis and validation.		
8	Mid term evaluation.		
9	The informative function of science discourse: information structure, impersonal expression, nominalized theme.		
10	Functional and rhetorical organization of written science discourse: genres (textbooks, journal articles and scientific posters).		
11	Research articles vs. review articles in professional journals. Content, rhetorical structure, communicative purpose.		
12	Formulaic language in science discourse: multifunctional lexical bundles. Interpersonal function of science discourse: hedges, boosters and author mention in science discourse.		
13	Disciplinary variation in science discourse: professional communities, discourse communities. Selecting from language resources according to disciplinary practices.		

14	Final test		
Bibliography 1. Munteanu, S.-C (2013) *Academic English for Science and Engineering*. Cluj-Napoca: Casa Cartii de Stiinta. ISBN 978-606-17-0398-2. 2. Swales John M. & Christine B. Feak (2001) *Academic Writing For Graduate Students - Essential Tasks And Skills*, Ann Arbor: The University Of Michigan Press. 3. Hyland Ken (2006) *English For Academic Purposes - An Advanced Resource Book*, London: Routledge			
8.2. Applications (Seminars, Laboratory, Projects)		Teaching methods	Notes
1	-		
Bibliography -			

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

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

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Assessment completion in due time; Ability to comprehend below and above sentence syntactic and morphologic structures specific to science discourse; to read from sources, to comprehend complex text (journal articles, textbooks); Ability to produce a conference poster based on a published research article		- Multiple choice quizzes - Case-study and practical application of knowledge: Conference poster		mid-term test = 50% students' posters = 40% classwork = 10% total = 100%
Applications						
10.4 Minimum standard of performance						
Assignment completion, minimum 80% of the midterm evaluation, min 80% on accuracy of poster.						

Course responsible
Assoc.prof.dr. Sonia Munteanu

Head of department
Conf.univ.dr. Ruxanda Literat