SYLLABUS

1. Data about the program of study

1.1	Institution	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	44.

2. Data about the subject

2.1	Subject name					Computer Networks					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Prof. dr. eng. Vasile Dădârlat – vasile.dadarlat@cs.utcluj.ro					
2.4	Teachers in charge of applications					Lect. dr. eng. Peculea Adrian – Adrian.Peculea@cs.utcluj.ro Lect. dr. eng. Iancu Bogdan – Bogdan.Iancu@cs.utcluj.ro					
2.5	Year of study	IV	2.6	Semester	7	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			
7	**Computer Networks**	**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	44
Supplementary study in the library, online and in the field	10
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	20
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 programming languages (C, Java) Computer architecture, Operating systems

5. Requirements (where appropriate)

5.1	For the course	N/A
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, working with partial and contradicting specifications
7.2	Specific objectives	Each student able to design LAN's software & hardware architecture

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Introduction. Concepts, network types, characteristics, evolution, standards	Oral Presentations using multimedia means Q & A Interactive teaching	
2	ISO-OSI Reference model and Internet's TCP/IP protocol stack. OSI abstract model presentation, description of protocol functions for every layer. General presentation for TCP/IP protocol stack		
3	Data transmission techniques. Data transmission concepts, analog and digital transmission techniques, coding, communication channels		
4	Types of computer networks. Architectures, evolution, topologies, physical parameters		
5	Physical level. Transmission media, characteristics, performances, connectors, structured cabling system		
6	Medium access control. Medium access techniques for local (wired and wireless) and wide area networks		
7	Data Link level. Functions, problems, protocols, case study: HDLC		
8	Local Area Computer Networks. Fundamentals, architectures, evolution		
9	Local Area Computer Networks. Systems, performances		
10	Computer Networks Interconnection. Devices for network interconnection; presentation of bridges, switches and routers		
11	Internet access. IP (+ ICMP), IPv6 (+IGMP) protocols. Address resolution protocol. Routing protocols		
12	Transport level protocols. TCP protocol; congestion control. TCP and UDP sockets		
13	General introduction to Internet applications. File transfer. Electronic mail, multimedia transmissions, network management		
14	General introduction to Internet applications. Security issues		

Bibliography

1. V.Dadarlat, E.Cebuc - Retele Locale de Calculatoare - de la cablare la interconectare, Editura Albastra (Microinformatica), Cluj, 2006, ISBN 973-650-161-2
2. W. Stallings, *Data and Computer Communications*; Prentice Hall , 2005
3. A. S. Tanenbaum, *Reţele de Calcultoare*; Agora Press,2004

8.2. Applications (Laboratory)		Teaching methods	Notes
1	Lab presentation; Elements of the structured cabling system	Practical exercises Brief	
2	Network connection techniques		
3	Spanning tree protocol		

4	Copper based media and cabling with UTP	presentation of possible solutions Self testing programmes	
5	Medium access methods		
6	Flow control protocols		
7	Protocol Inspector		
8	Optical Fiber and components		
9	Wireless access		
10	IP Addressing		
11	Network Inspector		
12	Network programming using sockets I		
13	Network programming using sockets II		
14	Lab exam		
Bibliography 1. Notes & lab notes available at: ftp.utcluj.ro			

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 protocols 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 Dadarlat

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	45.

2. Data about the subject

2.1	Subject name					Distributed Systems					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Prof. dr. eng. Ioan Salomie – Ioan.Salomie@cs.utcluj.ro					
2.4	Teachers in charge of applications					Lect. dr. eng. Tudor Cioară – Tudor.Cioara@cs.utcluj.ro Lect. dr. eng. Ionut Anghel – Ionut.Anghel@cs.utcluj.ro Lect. dr. eng. Cristina.Pop – Cristina.Pop@cs.utcluj.ro					
2.5	Year of study	IV	2.6	Semester	7	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			
7	**Distributed Systems**	**2**	**-**	**2**	**1**	**28**	**-**	**28**	**14**	**60**	**130**	**5**

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

Individual study	Hours
Manual, lecture material and notes, bibliography	18
Supplementary study in the library, online and in the field	6
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	24
Tutoring	
Exams and tests	12
Other activities	18

3.7	Total hours of individual study	60
3.8	Total hours per semester	130
3.9	Number of credit points	5

4. Pre-requisites (where appropriate)

4.1	Curriculum	Computer networks
4.2	Competence	Ability to analyze and design a local network using simulators available

5. Requirements (where appropriate)

5.1	For the course	Whiteboard, projector, computer
5.2	For the applications	Computers, software specific

6. Specific competences

Professional competences	**C4 -** Improving the performances of the hardware, software and communication systems (2 credits) **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 **C5 -** Designing, managing the lifetime cycle, integrating and ensuring the integrity of hardware, software and communication systems (2 credits) **C5.1** - Specifying the relevant criteria regarding the lifetime cycle, quality, security and the computing system's interaction with the environment and the human operator **C5.2** - Using interdisciplinary knowledge for adapting the computing system to the specific requirements of the application field **C5.3** - Using fundamental principles and methods for ensuring the security, the safety and ease of exploitation of the computing systems **C5.4** - Proper utilization of the quality, safety and security standards in the field of information processing **C5.5** - Creating a project including the problem's identification and analysis, its design and development, also proving an understanding of the basic quality requirements **C6 -** Designing intelligent systems (1 credit) **C6.1** - Describing the components of intelligent systems **C6.2** - Using domain-specific tools for explaining and understanding the functioning of intelligent systems **C6.3** - Applying the fundamental methods and principles for specifying solutions for typical problems using intelligent systems **C6.4** - Choosing the criteria and evaluation methods for the quality, performances and limitations of intelligent systems **C6.5** - Developing and implementing professional projects for intelligent systems
Cross competences	N/A

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

7.1	General objective	The study of concepts, techniques, algorithms, methods, methodologies and technologies specific to distributed systems
7.2	Specific objectives	Knowing and operating with these concepts, techniques, algorithms, methods, methodologies and technologies specific to distributed systems: communication inter-processes, middleware, issues non-functional, Socket, RPC models client-server, RMI, distributed transactions, SOA, Web Services , mobile, distributed algorithms, and data transactions on distributed

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Introduction to Distributed Systems, models and architectures of distributed systems	Using modern multimedia teaching methods and direct access to internet Students are invited to collaborate in research projects Tutorials and	
2	Quality of Service and non functional aspects of distributed systems		
3	Inter-process communication		
4	Logical time, global states, snapshots		
5	Basics of distributed algorithms, synchronizes, leader election, object replication		
6	Message ordering and group communication		
7	Detection problems: termination, deadlocks, failure, global predicates		
8	Failure detection and handling		
9	Consensus and agreement		
10	Distributed Transactions and Concurrency		

11	Distributed Data Management	personal assistance hours the semester and before the exam	
12	Internet computing - fundamentals and applications		
13	SOA, Web Services, Workflows		
14	Mobile and pervasive distributed systems		

Bibliography

1. 1. G. Coulouris, J.Dollimore, T.Kindberg – Distributed Systems. Concepts and Design, Addison Wesley, 2005
2. A. Tanenbaum, M. van Steen – Distributed Systems, Prentice Hall, 2002
3. A.D. Kshemkalyan M.Singhal - Distributed Computing, Cambridge Press 2008
4. IEEE Distributed Systems Online http://dsonline.computer.org/
5. Ioan Salomie, Lecture Notes, http://www.coned.utcluj.ro/~salomie/DS_2011

8.2. Applications (Laboratory, Projects)		Teaching methods	Notes
1-2	Basics of programming Web applications (2 lab sessions)	Short presentation of the themes laboratory, discussions on themes, themes implementing computer, personal computer miniproject	
3-4	Distributed Objects (2 lab sessions)		
5-6	Component-based distributed computing and systems (2 lab sessions)		
7-8	Message-based distributed computing and systems (2 lab sessions)		
9-10	SOA and Web Services (2 lab sessions)		
11-12	Business processes and workflows (2 lab sessions)		
13-14	Laboratory Test and Student project presentations and evaluation		

Bibliography

1. Ioan Salomie, Tudor Cioara, Ionut Anghel, Tudor Salomie – Distributed Computing and Systems – A practical Approach, Albastra Publ. House, 2008

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

It's a discipline domain "Computer and Information Technology". She instructs students in developing and implementing distributed systems sofware. Course content was determined by analyzing equivalent disciplines from other universities and based on the requirements of IT employers in Romania. Course content also was assessed by Romanian governmental agencies (CNEAA and ARACIS).

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Ability to conceptualize, analyze, specify and design distributed systems		Written Exam		55%
Applications		Ability analysis, specification, design, implementation and testing distributed systems		Assessment during the semester		45%

10.4 Minimum standard of performance

And specifying distributed systems modeling, design, implementation and testing of a functional model.

Course responsible
Prof.dr.eng. Ioan Salomie

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	46.10

2. Data about the subject

2.1	Subject name					Input/Output Systems and Peripheral Devices					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Prof. dr. eng. Zoltan Francisc Baruck – Zoltan.Baruch@cs.utcluj.ro					
2.4	Teachers in charge of applications					Prof. dr. eng. Zoltan Francisc Baruck – Zoltan.Baruch@cs.utcluj.ro Eng. Mihai Grigorescu – mihaigrigorescu13@gmail.com					
2.5	Year of study	IV	2.6	Semester	7	2.7	Assessment	exam	2.8	Subject category	DS/OP

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			
7	**Input/Output Systems and Peripheral Devices**	**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	34
Supplementary study in the library, online and in the field	12
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	18
Tutoring	5
Exams and tests	5
Other activities	0

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

4. Pre-requisites (where appropriate)

4.1	Curriculum	Computer Programming, Computer Architecture
4.2	Competence	Competences of disciplines Computer Programming and Computer Architecture

5. Requirements (where appropriate)

5.1	For the course	Projector, computer
5.2	For the applications	Computers, the Microsoft Visual Studio programming environment

6. Specific competences

Professional competences	**C4** – Improving the performances of the hardware, software and communication systems (2 credits) **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 **C5** – Designing, managing the lifetime cycle, integrating and ensuring the integrity of hardware, software and communication systems (3 credits) **C5.1** – Specifying the relevant criteria regarding the lifetime cycle, quality, security and the computing system's interaction with the environment and the human operator **C5.3** – Using fundamental principles and methods for ensuring the security, the safety and ease of exploitation of the computing systems
Cross competences	N/A

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

7.1	General objective	Knowledge of operation and performance parameters for input/output interfaces and peripheral devices; ability to communicate with controllers of peripheral devices
7.2	Specific objectives	- Using basic methods and principles for enhancing performance of computer systems - Designing input/output interfaces for connecting various devices to the computer - Designing and implementing in software input/output protocols - Writing system programs for controlling input/output interfaces

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Introduction. Programmed I/O	- PowerPoint presentations - Questions, discussions	N/A
2	Interrupt-Driven I/O. Direct Memory Access. I/O Processors		
3	Buses. Electrical Considerations. Synchronous and Asynchronous Buses. Bus Arbitration. VME Bus		
4	Local Buses. PCI Bus. PCI-X Bus. PCI Express Bus		
5	PCI Bus Variants for Personal Computers. PCI Bus Variants for Industrial Systems		
6	Serial Buses: I^2C; SPI; USB		
7	Mid-Term Exam		
8	Liquid Crystal Displays. Liquid Crystals. TN Technology. Addressing Methods. Backlighting		
9	Liquid Crystal Displays (cont.). Characteristics. VA Technology. IPS Technology		
10	Plasma Displays. Field Emission Displays. Organic LED Displays		
11	Graphics Adapters. Structure of a Graphics Adapter. Color Representation. Video Memory. Graphics Accelerators. 3D Accelerators		
12	Graphics Processing Units. Digital Interfaces for Monitors: DVI; HDMI; DisplayPort		
13	Optical Discs. Physical Medium. Data Organization and Encoding. The CD-ROM Drive. Types of Compact Discs		
14	DVD Discs. Blu-Ray Discs		

<table>
<tr><td colspan="4">Bibliography
1. Baruch, Z. F., Computer Input/Output Systems (in Romanian), Cartea Albastră, Cluj-Napoca, 2000, ISBN 973-9443-39-7.
2. Rosch, Winn L., Hardware Bible, Sixth Edition, Que Publishing, 2003, ISBN 0-7897-2859-1.</td></tr>
<tr><td colspan="2">8.2. Applications (Laboratory)</td><td>Teaching methods</td><td>Notes</td></tr>
<tr><td>1</td><td>The Serial Port (I)</td><td rowspan="14">- Additional explanations
- Using a programming environment for the C language</td><td rowspan="14">N/A</td></tr>
<tr><td>2</td><td>The Serial Port (II)</td></tr>
<tr><td>3</td><td>The PCI Express Bus (I)</td></tr>
<tr><td>4</td><td>The PCI Express Bus (II)</td></tr>
<tr><td>5</td><td>The System Management Bus (I)</td></tr>
<tr><td>6</td><td>The System Management Bus (II)</td></tr>
<tr><td>7</td><td>The Universal Serial Bus (I)</td></tr>
<tr><td>8</td><td>The Universal Serial Bus (II)</td></tr>
<tr><td>9</td><td>Printers</td></tr>
<tr><td>10</td><td>The SCSI Interface</td></tr>
<tr><td>11</td><td>The ATA Interface (I)</td></tr>
<tr><td>12</td><td>The ATA Interface (II)</td></tr>
<tr><td>13</td><td>Compact Discs. The ATAPI Interface</td></tr>
<tr><td>14</td><td>Laboratory Colloquy</td></tr>
<tr><td colspan="4">Bibliography
1. Lecture slides and laboratory works at http://users.utcluj.ro/~baruch/en/pages/teaching/inputoutput-systems.php</td></tr>
</table>

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

The contents of the discipline has been corroborated with the contents of similar disciplines in the USA and Europe, as well as with chapters related to input/output systems of acknowledged manuals used in prestigious universities. The discipline has been evaluated by the ARACIS agency.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Understanding theoretical concepts of input/output systems and the principle of operation for peripheral devices		Written exam		70%
Applications		Ability to write communication programs with controllers of peripheral devices		Written evaluation		30%
10.4 Minimum standard of performance						
Attendance of 100% at the laboratory sessions; Finishing at least one application in each laboratory session Attendance of minimum 50% at the lectures Grade > 5 for the written exam; Grade > 5 for the laboratory written evaluation.						

Course responsible
Prof.dr.eng. Zoltan Francisc Baruck

Head of department
Prof.dr.eng. Rodica Potolea

SYLLABUS

6. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Automation and Computer Science
1.3	Department	Computer Science
1.4	Field of study	Computer Science and Information Technology
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Computer Science/ Engineer
1.7	Form of education	Full time
1.8	Subject code	46.2

7. Data about the subject

2.1	Subject name					Parallel and Distributed Computing					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Assoc. prof. dr. eng. Anca Rarău					
2.4	Teachers in charge of applications					Lect. dr. eng. Anca Hangan					
2.5	Year of study	IV	2.6	Semester	7	2.7	Assessment	exam	2.8	Subject category	DS/OP

8. Estimated total time

Sem.	Subject name	Lecture	Applications			Lecture	Applications			Individual study	TOTAL	Credit
		[hours / week.]				[hours / semester]						
			S	L	P		S	L	P			
7	**Parallel and Distributed Computing**	**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	10
Supplementary study in the library, online and in the field	10
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
Tutoring	
Exams and tests	40
Other activities	

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

9. Pre-requisites (where appropriate)

4.1	Curriculum	
4.2	Competence	

10. Requirements (where appropriate)

5.1	For the course	
5.2	For the applications	C programming language

6. Specific competences

Professional competences	**C4** Improving the performances of the hardware, software and communication systems (2 credits) **C4.1** Identifying and describing the defining elements 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 **C5** Designing, managing the lifetime cycle, integrating and ensuring the integrity of hardware, software and communication systems (3 credits) **C5.2** Using interdisciplinary knowledge for adapting the computing system to the specifc requirements of the application field **C5.5** Creating a project including the problem's identification and analysis, its design and development, also proving an understanding of the basic quality requirements
Cross competences	N/A

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

7.1	General objective	1. Students become aware of differences and similarities between parallel and distributed computing so the students understand the boundaries of both domains. 2. Students become familiar with the principles of designing parallel programs. 3. Students become familiar with the main classes of distributed algorithms.
7.2	Specific objectives	Parallel algorithms performance and scalability. Parallel algorithms design. Distributed algorithms: time synchronization, distributed mutual exclusion, causal ordering, leader election and snapshots.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Introduction: goal, administrative issues, definition of parallel system and distributed systems.	Interactive lectures using PPT presentations, exercises (at whiteboard) and questions addressed to the students.	
2	Performance and scalability: metrics, scalability definition, Amdahl's law.		
3	Parallel algorithm design: parallelization process, data dependency.		
4	Parallel algorithm design: case study: ocean simulation.		
5	Parallel algorithm design: decomposition techniques, mapping techniques for load balancing.		
6	Interconnection networks: static interconnection networks (metrics, topologies), dynamic interconnection networks (buses, crossbars, multistage networks).		
7	Dense matrix algorithms: matrix-vector multiplication (1D partitioning and 2D partitioning, comparison 1D to 2D), matrix-matrix multiplication (2D partitioning, Cannon algorithm).		
8	Time: physical clocks synchronization (Cristian algorithm, Berkeley algorithm, Network Time Protocol), logical clocks (Scalar time, Vector time, efficient implementation of vector clocks - Singhal-Kshemkalyani).		
9	Distributed mutual exclusion: problem definition, Token-ring, Suzuki-Kasami, central coordinator, Lamport, Ricart-Agrawala.		
10	Causal ordering: problem definition, Birman-Schiper-Stephenson, Schiper-Eggli-Sandoz.		
11	Leader election: problem definition, general networks (FloodMax, OptFloodMax), synchronous / asynchronous ring (LeLann, Chang-Roberts, Hirschberg-Sinclair).		

12	Leader election: synchronous / asynchronous ring (Franklin, Peterson), anonymous ring (Itai-Rodeh).		
13	Snapshot: problem definition, Chandy-Lamport, Spezialetti-Kearns, Lai-Yang.		
14	Data analysis with Hadoop Discussion on parallel vs. distributed vs. concurrent.		
Bibliography 1. Introduction to Parallel Computing, A. Grama, A. Gupta, G. Karpypis, V. Kumar, 2003 2. Distributed Computing: Principles, Algorithms, and Systems, A. D. Kshemkalayani, M. Singhal, Cambridge University Press, 2008			
8.2. Applications (Laboratory)		Teaching methods	Notes
1	Introduction in PVM	Problem based approach.	
2	Message-passing functions and the task control functions (I)		
3	Message-passing functions and the task control functions (II)		
4	Control functions of the virtual machine and advanced functions (I)		
5	Control functions of the virtual machine and advanced functions (II)		
6	Process groups functions (I)		
7	Process groups functions (II)		
8	Implementing Cannon's algorithm using the PVM library		
9	Introduction to grid computing		
10	Job execution in Condor (I)		
11	Job execution in Condor (II)		
12	Workflows in Condor		
13	Laboratory test		
14	Laboratory test		
Bibliography 1. Introduction to Parallel Computing, A. Grama, A. Gupta, G. Karpypis, V. Kumar, 2003 2. Distributed Computing: Principles, Algorithms, and Systems, A. D. Kshemkalayani, M. Singhal, Cambridge University Press, 2008			

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

As Cluj software workforce market gets more sophisticated, having solid knowledge of how to develop parallel programs and mastering the distributed computing are qualities that software companies look for.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Formal assessment to test theoretical knowledge and problem solving skills. Attendance and activity.		Written exam.		70%
Applications		Formal assessment to test practical skills for designing parallel solutions and implementation parallel solutions. Attendance and activity.		Colloquium and problems during term.		30%
10.4 Minimum standard of performance						
Design and implementation of parallel solutions using the theoretical models and tools (PVM and Condor). Pre-requisite for written exam: 6 mandatory lecture attendances.						

Course responsible
Assoc. prof.dr.eng. Anca Rarau

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	47.1

2. Data about the subject

2.1	Subject name					Operating Systems Design					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Lect. dr. eng. Adrian Coleşa – adrian.colesa@cs.utcluj.ro					
2.4	Teachers in charge of applications					Lect. dr. eng. Adrian Coleşa – adrian.colesa@cs.utcluj.ro Eng. Andrei Luțaș – andrei.lutas@bitdefender.ro Eng. Ghoerghe Hajmașan – ghita.hajmasan@bitdefender.ro Eng. Radu Ciocas – rciocas@bitdefender.com					
2.5	Year of study	IV	2.6	Semester	7	2.7	Assessment	exam	2.8	Subject category	DS/OP

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			
7	**Operating Systems Design**	**2**	**-**	**2**	**1**	**28**	**-**	**28**	**14**	**85**	**155**	**6**

3.1	Number of hours per week	5	3.2	of which, course	2	3.3	applications	3
3.4	Total hours in the teaching plan	70	3.5	of which, course	28	3.6	applications	42
Individual study								Hours
Manual, lecture material and notes, bibliography								40
Supplementary study in the library, online and in the field								0
Preparation for seminars/laboratory works, homework, reports, portfolios, essays								42
Tutoring								1
Exams and tests								2
Other activities								0

3.7	Total hours of individual study	85
3.8	Total hours per semester	155
3.9	Number of credit points	6

4. Pre-requisites (where appropriate)

4.1	Curriculum	Computer Programming, Operating Systems
4.2	Competence	C Programming, OS concepts understanding, OS system call usage

5. Requirements (where appropriate)

5.1	For the course	Students must have minimum 9 classes attended to be allowed to take the exam
5.2	For the applications	Students must have minimum 11 classes attended to be allowed to take the exam

6. Specific competences

Professional competences	**C5**: Designing, managing the lifetime cycle, integrating and ensuring the integrity of hardware, software and communication systems **C5.1**: Specifying the relevant criteria regarding the lifetime cycle, quality, security and the computing system's interaction with the environment and the human operator **C5.2**: Using interdisciplinary knowledge for adapting the computing system to the specific requirements of the application field **C5.3**: Using fundamental principles and methods for ensuring the security, the safety and ease of exploitation of the computing systems **C5.4**: Proper utilization of the quality, safety and security standards in the field of information processing **C5.5**: Creating a project including the problem's identification and analysis, its design and development, also proving an understanding of the basic quality requirements
Cross competences	N/A

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

7.1	General objective	Have a clear understanding of the OS' and its components' detailed functionality, structure and dsign methods.
7.2	Specific objectives	Understand the OS structure, its components' functionality and their inter-relationships. Knowledge about different design and implementation alternatives (advantages and disadvantages) of different OS components. Capability to design different OS components, like: thread scheduler, synchronization mechanisms, processes and threads, virtual memory, file system.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	**General structure of an OS**. Possible OS structures (monolithic, layered, micro-kernel, virtual machine, exokernel), its components, their functionality, role, interconnectivity.	(1) lecture presentation based on beamer presentation; (2) interactions with students: ask their opinion relative to the presented subject; (3) give each class a short evaluation test; let students discuss and argue each other their solution; give them the good solution and let them evaluate their own one; (4) propose 2-3 interesting study cases of OSes to be prepared and	
2	**Process and thread management (1)**. Scheduling algorithms. FCFS, SJF, RR, Priority-based, Lottery. Priority inversion.		
3	**Process and thread management (2)**. Use cases. Solaris, Windows and Linux process management and scheduling.		
4	**Synchronization mechanisms (1)**. General Design Principles. Hardware mechanisms used for implementation of higher-level synchronization mechanisms. Design and implementation of locks, semaphores, condition variables. Deadlock avoidance.		
5	**Synchronization mechanisms (2)**. Linux and Windows Use Cases. The synchronization mechanisms provided by Linux and Windows. The way they are implemented.		
6	**Synchronization mechanisms (3)**. Deadlock. Deadlock avoidance, prevention and detection algorithms.		
7	**Process management**. Design and implementation aspects related to system calls. Techniques and strategies for design and implementation of processes and threads support.		
8	**Open files management**. Design aspects. Illustration on the Linux Virtual Fule System (VFS).		
9	**Memory management (1)**. General Design Principles. Design and implementation alternatives of different memory management techniques and mechanisms paging, segmentation, and swapping.		
10	**Memory management (2)**. Virtual memory's design and implementation aspects. Page replacement algorithms.		
11	**Memory management (3)**. Use cases. Linux and Windows memory		

	management solutions.	presented by students; (5) students are invited to collaborate in research projects.	
12	**File systems (1)**. General Design Aspects. Design and implementation alternatives of file systems concepts (files, directories), storage space management. Advantages and disadvantages.		
13	**File systems (2)**. Linux and Windows File Systems. Design and implementation of Ext2 and NTFS.		
14	**Security aspect. Subject review.** Basic security aspects design. Overview of all presented subjects.		

Bibliography

1. A. Silberschatz, G. Gagne, P. B. Galvin, *Operating Systems Concepts*, 7th edition, Wiley, 2005, ISBN 978-0-471-69466-3
2. A. Tanenbaum, A. Woodhull. *Operating Systems Design and Implementation*. 3rd edition, Prentice Hall, 2006, ISBN: 0131429388
3. Daniel Pierre Bovet, *Understanding Linux Kernel*, O'Reilly & Associates, 2001, ISBN 0-596-00002-2.

8.2. Applications (Laboratory, Projects)		Teaching methods	Notes
1	Introduction of the Pintos OS	(1) students are presented a very brief overview of the most important and difficult aspects of the working subject ; (2) students are given at the beginning of each class a short evaluation quiz; (3) students are given a hands-on tutorial to practice with working subject's aspects and to solve problems (4) students are given challenging problems for extra credit;	
2	GNU Make. Apply it on the Makefile files in Pintos		
3	OS debugging techniques applied in Pintos		
4	Pintos' thread system		
5	Thread scheduling in Pintos		
6	Pintos' synchronization mechanisms		
7	System call mechanism in Pintos. Simple system call implementation		
8	Process management in Pintos		
9	Multi-threading support implementation in Pintos		
10	Virtual memory in Pintos. Practice with basic data structure and mechanism		
11	Virtual memory in Pintos. Swapping, page replacement algorithms, memory-mapped files		
12	Pintos' file system. Practice with the basic data structure. Implement extendable files.		
13	Pintos' file system. Implement subdirectory support.		
14	Lab knowledge evaluation.		

Bibliography

1. Lecture slides and laboratory text and support at http://os.obs.utcluj.ro/*moodle*

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

OSD course presents techniques for hardware and software resources management, which are applicable on any complex management software application. Besides, it provides students detailed knowledge about modern OSes' internals, making them capable of developing more efficient applications. The course curriculum maps the IT companies expectations, especially those dealing with direct access to OS services or developing kernel drivers or modules. Such companies are, for instance, system and data security and antivirus detection companies.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Knowledge about design alternatives of different OS		Oral examination. Detailed		0.5

		components. Capability to apply theoretical knowledge on real situations.		discussion about design alternatives of different OS components. Solving real OS design problems.		
Applications		Knowledge about main data structures and mechanisms in Pintos OS. Capability to design and implement improvement solutions for different Pintos components.		*Lab*: implementation of different problems in Pintos. *Project*: argumentation of design and implementation solutions		0.2 0.3
10.4 Minimum standard of performance						
Knowledge of the design principles of the basic OS components, like process manager, memory manager, file system. Be able to implement a simple system call in Pintos relatedto the mentioned components.						

Course responsible
Lect.dr.eng. Adrian Colesa

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	47.2

2. Data about the subject

2.1	Subject name					User Interface Design					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Prof. dr. eng. Gorgan Dorian – dorian.gorgan@cs.utcluj.ro					
2.4	Teachers in charge of applications					Lect. dr. eng. Ştefănuţ Teodor, teodor.stefanut@cs.utcluj.ro , Dr. eng. Mihon Dănuţ, vasile.mihon@cs.utcluj.ro					
2.5	Year of study	IV	2.6	Semester	7	2.7	Assessment	exam	2.8	Subject category	DS/OP

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			
7	**User Interface Design**	**2**	**-**	**2**	**1**	**28**	**-**	**2**	**1**	**85**	**155**	**6**

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

Individual study	Hours
Manual, lecture material and notes, bibliography	40
Supplementary study in the library, online and in the field	10
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	20
Tutoring	6
Exams and tests	9
Other activities	0

3.7	Total hours of individual study	85
3.8	Total hours per semester	155
3.9	Number of credit points	6

4. Pre-requisites (where appropriate)

4.1	Curriculum	Computer programming (C or Java), Elements of Computer Assisted Graphics, Software Engineering
4.2	Competence	The fundamental methodology for the development of software applications

5. Requirements (where appropriate)

5.1	For the course	Projector, computer
5.2	For the applications	Laboratory attendance is mandatory Study of laboratory materials from the server

6. Specific competences

Professional competences	**C5 -** Designing, managing the lifetime cycle, integrating and ensuring the integrity of hardware, software and communication systems (6 credite) **C5.1 -** Specifying the relevant criteria regarding the lifetime cycle, quality, security and the computing system's interaction with the environment and the human operator **C5.2 -** Using interdisciplinary knowledge for adapting the computing system to the specifc requirements of the application field **C5.3 -** Using fundamental principles and methods for ensuring the security, the safety and ease of exploitation of the computing systems **C5.4 -** Proper utilization of the quality, safety and security standards in the field of information processing **C5.5 -** Creating a project including the problem's identification and analysis, its design and development, also proving an understanding of the basic quality requirements
Cross competences	N/A

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

7.1	General objective	Study and experiment the methodology of interactive software applications development. Study Human-Computer interaction techniques.
7.2	Specific objectives	1. Apply the user centred software development methodology 2. Study and experiment the techniques that are specific to the flexible methodology of the development of interactive applications and graphical user interfaces 3. Implementation of new and efficient human-computer interaction techniques 4. Usability evaluation in interactive applications

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Introduction. History	New multimedia teaching approaches will be used in classes. The course is interactive and includes demonstrations that exemplify different user interaction techniques and the software development methodology.	During the semester and before each exam there are a few preparation hours planned.
2	User interface development concepts		
3	Input and output communication concepts		
4	User oriented design methodology		
5	User interface design methodology		
6	User interface usability		
7	User requirements definition		
8	Task description and analysis		
9	User interface prototyping		
10	Cognitive walkthrough and heuritic evaluation		
11	Interaction styles and techniques		
12	Web technologies. Audio and video technologies		
13	Wireless technologies		
14	User interface development environments		

Bibliography

1. Shneiderman B.: "*Designing the User Interface. Strategies for Effective Human Computer Interaction*", Addison-Wesley, 1992.
2. Galitz W.O.: "*The Essential Guide to User Interface Design*". John Wiley & Sons, 1997.

In virtual library

1. Resurse curs, http://cgis.utcluj.ro/didactic

8.2. Applications (Laboratory)		Teaching methods	Notes
1	Introduction. Administrative	Documentation and examples will be available to the students, prior to the laboratory classes, on a dedicated server.	
2	Static and dynamic HTML pages		
3	JavaScript Language and DHTML		
4	Dynamic HTML pages, JavaScript and AJAX Technology		
5	Graphical user interface development methodologies. jQuery Technology		
6	Simple animation. Adobe Flash Technology		

7	Animation description. Action Script 3 Technology	The students will work independently but will also be assisted by the teacher.	
8	User interface prototyping. Adobe FLEX Technology		
9	Complex prototyping – Part 1. FLEX and Action Script 3 Technology		
10	Complex prototyping – Part 2. Communication techniques prototyping components		
11	Java based prototyping techniques. JavaFX Technology		
12	Complex user interface development. XAML Technology		
13	Dynamical user interfaces. Silverlight Technology		
14	Assessment		
Applications (Projects)		Teaching methods	Notes
1	Project proposal: subject, methodology, phases, organization, project contents, project evaluation;	Documentation and examples will be available to the students on a dedicated server.	Each student will have to develop a specific project based on the knowledge acquired at the laboratory hours.
2	Project definition. Evaluation report;		
3	Task description and analysis;		
4	Low fidelity prototyping, and scenarios;		
5	Cognitive walkthrough;		
6	Heuristic evaluation;		
7	Prototyping plan;		
8	Prototype codification;		
9	User test cases;		
10	Prototype evaluation and evaluation reports;		
11	Iterative enhancement of the prototype;		
12	Final user interface development;		
13	Document writing;		
14	Project presentation and evaluation.		

Bibliography

1. Gorgan D., Harsan H.: "*User Interface Design: Laboratory works*". Casa Cărţii de Ştiinţă, 2000.

In virtual library

1. Curs şi lucrări practice, http://cgis.utcluj.ro

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

This discipline is integrated into the Computers and Information Technology domain. The content is classic, yet modern, and introduces to students the user centred methodology for the development of interactive software applications and graphical interfaces. The content of this discipline has been aligned with the information presented in similar disciplines from other major universities and companies from Romania, Europe and USA and has been evaluated by the authorized Romanian governmental agencies (CNEAA and ARACIS).

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		The written exam tests the understanding of the information presented in classes and the ability to apply this knowledge. The activity in class evaluates the active involvement of the students in the teaching process and their participation to the discussions, debates and other class activities during the entire semester.		Evaluation is performed through written exam (E) and classes activity (AC)		50% (E) 10% (AC)
Applications		Laboratory assessment evaluates the practical abilities obtained by the students. Through project assignments the students have the opportunity to develop their skill in applying the notions, concepts and methods presented in class.		Evaluation is performed through written exam and project assessment.		25% (C) 25% (P)
10.4 Minimum standard of performance						
Grades > 5 for both theoretical and practical assessments						

Course responsible
Prof.dr.eng. Dorian Gorgan

Head of department
Prof.dr.eng. Rodica Potolea

SYLLABUS

11. 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	48.1

12. Data about the subject

2.1	Subject name					Pattern Recognition Systems					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Prof. dr. eng. Sergiu Nedevschi – Sergiu.Nedevschi@cs.utcluj.ro					
2.4	Teachers in charge of applications					Conf. dr. eng. Tiberiu Marita, Conf.dr.eng. Radu Danescu, Conf.dr.eng. Florin Oniga {Tiberiu.Marita, Radu.Danescu,Florin.Oniga}@cs.utcluj.ro					
2.5	Year of study	IV	2.6	Semester	7	2.7	Assessment	exam	2.8	Subject category	DS/OP

13. Estimated total time

Sem.	Subject name	Lecture	Applications			Lecture	Applications			Individual study	TOTAL	Credit
		[hours / week.]				[hours / semester]						
			S	L	P		S	L	P			
7	**Pattern Recognition Systems**	**2**	**-**	**2**	**1**	**28**	**-**	**28**	**14**	**85**	**155**	**6**

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

Individual study	Hours
Manual, lecture material and notes, bibliography	28
Supplementary study in the library, online and in the field	20
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	28
Tutoring	4
Exams and tests	5
Other activities	0

3.7	Total hours of individual study	85
3.8	Total hours per semester	155
3.9	Number of credit points	6

14. Pre-requisites (where appropriate)

4.1	Curriculum	Image Processing
4.2	Competence	Computer programming, Data structures and algorithms, Probability Theory, Artificial Intelligence.

15. Requirements (where appropriate)

5.1	For the course	Blackboard, video projector, computer
5.2	For the applications	Workstations, specific software (Visual Studio, Diblook, OpenCV, Matlab)

6. Specific competences

Professional competences	**C4 –** Improving the performances of the hardware, software and communication systems (2 credits) **C4.2 –** Explaining the interaction of the factors that determine the performances of the hardware, software and communication systems **C4.3 –** Applying the main methods and principles for increasing the performances of the hardware, software and communication **C5 –** Designing, managing the lifetime cycle, integrating and ensuring the integrity of hardware, software and communication systems (2 credits) **C5.1 -** Specifying the relevant criteria regarding the lifetime cycle, quality, security and the computing system's interaction with the environment and the human operator **C5.2 -** Using interdisciplinary knowledge for adapting the computing system to the specifc requirements of the application field **C5.3 -** Using fundamental principles and methods for ensuring the security, the safety and ease of exploitation of the computing systems **C5.5 -** Creating a project including the problem's identification and analysis, its design and development, also proving an understanding of the basic quality requirements **C6 –** Designing intelligent systems (2 credits) **C6.2 –** Using domain-specific tools for explaining and understanding the intelligent systems' functioning **C6.4 –** Choosing the criteria and evaluation methods for the intelligent systems' quality, performances and limitations
Cross competences	N/A

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

7.1	General objective	Knowledge, understanding and use of concepts related to pattern recognition.
7.2	Specific objectives	Knowledge, understanding and use of model-based pattern reconition methods using statistical approaches, linear discriminant methods, support vectors, and ensemble of classifiers. Knowledge, understanding and use of the specific operations of a pattern recognition system: data preprocessing, dimensional reduction, relevant feature selection, building the prediction model, selection of the optimum model, performance analysis.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Model-based recognition 1: Mathematical model of the 2D and 3D recognition from intensity and depth images.	Interactive teaching, using oral presentations supported by multimedia tools, consultations, involving students in research and development activities.	N/A
2	Model based recognition 2: Model based recognition problems. Computational strategies.		
3	Statistical recognition 1: Review of basic statistics and probabilities notions. Decision theory.		
4	Statistical recognition 2: Liniar and quadratic classifiers.		
5	Statistical recognition 3: Bayes classifiers.		
6	Statistical recognition 4: Density estimation.		
7	Recognition using image models.		
8	Structural recognition 1: Features extraction and selection. Constraints.		
9	Structural recognition 2: Model and scene representation. Exact matching. Search space.		
10	Structural recognition 3: Exhaustive matching methods.		
11	Structural recognition 4: Search space reduction methods: three search		
12	Structural recognition 5: Search space reduction methods: hypothesis generation and checking.		
13	Intermediate representation. Inexact matching.		

14	Model-based recognition 1: Mathematical model of the 2D and 3D recognition from intensity and depth images.		

Bibliography

1. S. Nedevschi, "Prelucrarea imaginilor si recunoasterea formelor", *Ed. Microinformatica*, 1997.
2. Richard O. Duda, Peter E. Hart , David G . Stork, "Pattern Clasification", *John Wiley and Sons,* 2001.
3. S. Theodoridis, K. Koutroumbas, “Pattern Recognition”, 2-nd Edition, *Academic Press*, 2003.
4. W.E. Grimson, "Object Recognition by Computer: The Role of Geometric Constraints", *MIT Press,* 1990.

8.2. Applications (Laboratory)		Teaching methods	Notes
1	Geometric transforms.	Presentation using the blackboard and multimedia tools. Experiments and implementation using specific software tools (MS Visual Studio, Diblook) Evaluation of the design and implementation phases.	N/A
2	Detection of geometric features of the objects.		
3	Geometric invariant shape features. Moments.		
4	Edge detection using the zero crossing of the oriented second order derivative. Contour following and closing.		
5	Objects shape characterization using contour descriptors. The use of radial distance.		
6	Color image features. Color features obtained from the local histograms analysis..		
7	Minimal distance classifier.		
8	Nearest neighbor classifier. Bayes clasifier.		
9	Unsupervised recognition algorithms: threshold, min-max distance, K-means.		
10	Matching the model with the scene using rigid patterns.		
11	Matching the model with the scene using parametric patterns.		
12	Matching using symbolic structures 1: features selection.		
13	Matching using symbolic structures 2: indexing model features..		
14	Matching using symbolic structures 3: performing correspondences.		
Applications - Projects			
1	Topic assignment (week 1, 2)		
2	Analyzes, specification and design (week 3,4)		
3	Presentation of the approach (week 5,6)		
4	Implementation (week 6,7,8,9,10); Intermediate presentation (week 9,10)		
5	Evaluation and optimization (week 11,12)		
6	Report elaboration (week 12,13)		
7	Final Presentation (week 13,14)		

Bibliography

S. Nedevschi, "Lecture Notes", ftp://ftp.utcluj.ro/pub/users/nedevschi/SRF/

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

The subject is part of the Computer Science and Information Technology curriculum, its contents combining fundamental and practical aspects used in the field of pattern recognition. The subject content is correlated with the specific curricula of other Universities, in Romania and abroad, and is evaluated by government agencies (CNEAA and ARACIS). The subject’s activities are meant to make the students familiar with the applications and the research directions of the image processing field, helped by the internationally renowned experience of the teachers.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Testing the theoretical knowledge acquired, and the practical abilities of problem solving.		Written exam		50 %
Applications		Testing the practical abilities of designing and implementing solutions to specific problems. Attendance and activity.		Lab exam, project assessment		50 %

10.4 Minimum standard of performance

Modeling and implementation of solutions to specific engineering problems, using the domain’s formal apparatus.

Course responsible
Prof.dr.eng. Sergiu Nedevschi

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	48.2

2. Data about the subject

2.1	Subject name					Translators Design					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Assoc.prof. dr. eng. Emil Şt. Chifu – emil.chifu@cs.utcluj.ro					
2.4	Teachers in charge of applications										
2.5	Year of study	IV	2.6	Semester	7	2.7	Assessment	exam	2.8	Subject category	DS/OP

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			
7	**Translators Design**	**2**	**-**	**2**	**1**	**28**	**-**	**28**	**14**	**85**	**155**	**6**

3.1	Number of hours per week	5	3.2	of which, course	2	3.3	applications	3
3.4	Total hours in the teaching plan	70	3.5	of which, course	28	3.6	applications	42
Individual study								Hours
Manual, lecture material and notes, bibliography								30
Supplementary study in the library, online and in the field								15
Preparation for seminars/laboratory works, homework, reports, portfolios, essays								27
Tutoring								10
Exams and tests								3
Other activities								0

3.7	Total hours of individual study	85
3.8	Total hours per semester	155
3.9	Number of credit points	6

4. Pre-requisites (where appropriate)

4.1	Curriculum	Formal Languages and Translators, Computer Programming, Data Structures and Algorithms
4.2	Competence	- Basic knowledge of programming and data structures (preferably in the C and Java languages) - Concepts of generative grammars and formal languages - To know the basic principles in the design of interpretors and translators for languages artificial

5. Requirements (where appropriate)

5.1	For the course	Blackboard, overhead projector, computer
5.2	For the applications	Computers, specific software

6. Specific competences

Professional competences	**C4 –** Improving the performances of the hardware, software and communication systems (2 credits) **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 **C4.5 –** Developing professional solutions for hardware, software and communication systems based on performance optimization **C5** – Designing, managing the lifetime cycle, integrating and ensuring the integrity of hardware, software and communication systems (2 credits) **C5.2 –** Using interdisciplinary knowledge for adapting the computing system to the specifc requirements of the application field **C5.5** – Creating a project including the problem's identification and analysis, its design and development, also proving an understanding of the basic quality requirements **C6** – Designing intelligent systems (2 credits) **C6.2 –** Using domain-specific tools for explaining and understanding the functioning of intelligent systems **C6.3** – Applying the fundamental methods and principles for specifying solutions for typical problems using intelligent systems **C6.5 –** Developing and implementing professional projects for intelligent systems
Cross competences	N/A

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

7.1	General objective	• To know the phases of the programming language translators: lexical analysis, syntactic analysis, code generation, and code optimization. • To master the tree structure representation of Web documents.
7.2	Specific objectives	• To know the classes of languages for which efficient translators and interpreters can be implemented. • To know the rules for processing typical statements for code generation. • To understand the difference between structure and presentation of documents. • By using the Java language, to implement parsers of type SAX and DOM for XML documents containing DTD validation information. • By using the Java language, to implement XML document transformators, based on XSLT transformations. • To design, develop and test a project, by utilizing parser generators, to arrive at a translator.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Lexical analyzer design: Implementation of lexical analyzers based on type 3 grammars.	- The main ideas with multimedia tehniques - Details and examples at the blackboard, in interaction with the students	N/A
2	Lexical analyzer design: Implementation of lexical analyzers based on type 3 grammars.		
3	Lexical analyzer design: Implementation of lexical analyzers based on type 3 grammars.		
4	Syntactic analyzer design: Implementation of top-down and bottom-up syntactic analyzers.		

5	Syntactic analyzer design: Implementation of top-down and bottom-up syntactic analyzers.	- There are consultation hours - Students are invited to collaborate in research projects	
6	Syntactic analyzer design: Implementation of top-down and bottom-up syntactic analyzers.		
7	Translator grammars: Translator grammars for the implementation of top-down and bottom-up parsers.		
8	Translator grammars: Translator grammars for the implementation of top-down and bottom-up parsers.		
9	Code generators: Generation of declarations and statements.		
10	Code generators: Generation of declarations and statements.		
11	Code generators: Generation of declarations and statements.		
12	Code generators: Generation of declarations and statements.		
13	Optimizations of the object code: Object code optimization based on syntax trees and based on determining the subexpressions of an expression.		
14	Optimizations of the object code: Object code optimization based on syntax trees and based on determining the subexpressions of an expression.		

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4. I.A. Leţia, E.Şt. Chifu, Limbaje formale şi translatoare, Ed. Casa cărţii de ştiinţă, 1998.
5. L. Negrescu, Limbaje de programare şi procesoare de limbaje, Ed. Casa cărţii de ştiinţă, 2000.
6. L.A. Phillips, XML, Ed. Teora, 2001.

8.2. Applications (Laboratory, Projects)		Teaching methods	Notes
L1	*Definition of individual assignment (case study)*: Each student has assigned a software tool (product) used in the design and implementation of translators. These tools are available at URL http://www.combo.org/lex_yacc_page/#tools	Brief presentation at the blackboard, implementing and testing individual project on the computer	
L2	Installing and running the software tool.		
L3	Installing and running the software tool.		
L4	Studying the software tool. The students experiment the use of the product based on the authors' examples.		
L5	Studying the software tool.		
L6	Studying the software tool.		
L7	Definition of the student own example, based on the existing examples or on a specific problem taken from reality.		
L8	*Presentation no. 1 (evaluation)*: Description of the product and the trace of an example.		
L9	Definition of student own example design (regular expressions, grammar of the language to analyze etc.).		
L10	Implementation of the assignment (own example): Developing and testing a software project, by using the assigned tool. The assignment materializes as a translator for an artificial language.		
L11	Implementation of the assignment.		
L12	Implementation of the assignment.		
L13	Implementation of the assignment.		
L14	Presentation no. 2 (evaluation): Presentation of the student own example.		
P1	Definition of the XML language.	Brief presentation at the blackboard, implementing and testing homeworks on the computer	
P2	Parser of type SAX in Java. Parser of type DOM in Java.		
P3	XML documents with DTD validation information. SAX parser for validating XML documents using DTD information.		
P4	DOM parser for validating XML documents using DTD information. Transformators implemented in Java.		
P5	XSLT transformations. HTML documents.		
P6	XSLT transformations. HTML documents.		
P7	Transformation of XML documents into HTML documents. Final assessment of the individual project.		

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1. I.A. Leţia, D. Marcu, B. Ungureanu, Procesoare de limbaje. Îndrumător de laborator, Universitatea

Tehnică din Cluj-Napoca, 1995.

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

It is a specialty course in Computer Science, its syllabus being both classical and modern. It teaches the students with the principles of efficient design and implementation of interpreters and translators for artificial languages. The syllabus of the course has been discussed with other important universities and companies from Romania, Europe, and USA. This syllabus has been evaluated by Romanian governmental agencies (CNEAA and ARAIS).

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		- Problem-solving skills - Attendance, Activity		- Written exam		40%
Applications		- Problem-solving skills - Attendance, Activity		- Assesement of the individual proejct - Written exam		40% 20%
10.4 Minimum standard of performance						
Modeling a typical engineering problems using the domain specific formal apparatus Obtaining final grade 5						

Course responsible
Assoc. prof.dr.eng. Emil Chifu

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	49.1

2. Data about the subject

2.1	Subject name					Marketing					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					S.l. Veronica Maier					
2.4	Teachers in charge of applications										
2.5	Year of study	IV	2.6	Semester	7	2.7	Assessment	Colloquium	2.8	Subject category	DC/OP

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			
7	**Marketing**	**2**	**-**	**-**	**-**	**28**	**-**	**-**	**-**	**48**	**76**	**3**

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	14
Supplementary study in the library, online and in the field	7
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
Tutoring	9
Exams and tests	4
Other activities	-

3.7	Total hours of individual study	48
3.8	Total hours per semester	76
3.9	Number of credit points	3

4. Pre-requisites (where appropriate)

4.1	Curriculum	Management and communication
4.2	Competence	Being acquainted with the basics of managing an organizational department/group

5. Requirements (where appropriate)

5.1	For the course	Presence of multimedia technology
5.2	For the applications	Not the case

6. Specific competences

Professional competences	**C5 –** Designing, managing the lifetime cycle, integrating and ensuring the integrity of hardware, software and communication systems (2 credits) **C5.2 –** Using interdisciplinary knowledge for adapting the computing system to the specifc requirements of the application field **C5.3 -** Using fundamental principles and methods for ensuring the security, the safety and ease of exploitation of the computing systems
Cross competences	**CT1 –** Honorable, responsible, ethical behavior, in the spirit of the law, in order to ensure the professional reputation (1 credit)

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

7.1	General objective	To understand the basics of marketing process: identifying and satisfying in a profitable and social responsible way the market needs through: offering the most appropriate product, at the right price, using the most effective and efficient distribution channel, with the most effective and efficient communication mix.
7.2	Specific objectives	- To understand the role and ways of creating value for customers as mean of the organization's wellbeing - To understand the basic concepts of socially responsible marketing and marketing research in contemporary global business - To understand the basics of designing marketing strategies and plans in the more and more complex and dynamic general and task environment and based on consumer behavior analysis and buying decisional factors - To understand and use of effective marketing mix: Product, Price, Place (Distribution) and Promoion (Communication) for each identified and assessed market segment

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Marketing role in big and small companies and in society: to contribute to company prosperity through creating a high value for the customers; to make the company responsible on the long range in front of community, society and environment. Marketing specific activities	Interactive lecturing, ppt./prezi support/short movies related to the interest topic/in class exercises-	2
2	Marketing concepts (philosophies) in contemporary organizations: Volume? Quality? Sales? Customer satisfaction?		2
3	Marketing environment analysis. Micro and macro environment: suppliers, interest groups, customers, economic, demographic, technological, natural, legal and cultural environment		2
4	Marketing research: research plan, data collection; data analysis quantitative and qualitative techniques; experiments; research report. Marketing information systems		2
5	Marketing strategic planning: creating and maintaining the balance between objectives, resources and market opportunities. Methods of strategic analysis.		2
6	Designing the strategic plan at four levels: company, divisions, strategic units and brands		2
7	Consumer behavior analysis: patterns of behavior		2
8	Buying decision process		2
9	Market segmentation. Criteria and methods of market segmentation		2
10	Product policy. Product life cycle. Researching and developing new products		2

11	Product strategies for the life cycle stages. Positioning strategies		2
12	Pricing. Pricing policy objectives. Pricing and legal constraints. Pricing policies: market penetration and market skimming		2
13	Product distribution. Choosing the distribution channels. Managing and controlling the distribution channels		2
14	Marketing communication. Communication process. Marketing communication mix: advertising, publicity, sales promotion, sales force, direct marketing, public relations		
Bibliography 1. D. Catana, Marketing (2014), lecture support, available (with password) at www.marketing.utcluj.ro ***2.*** D. Catana, Gh. A. Catana (2009), Fundamentals of Marketing, UTPRES			
8.2. Applications (Seminars, Laboratory, Projects)		Teaching methods	Notes
1	Not the case	-	-
Bibliography			

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

The syllabus is set up based upon the feedback got from employers of UTCN alumni, as well as on trends in the business and general environment

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Exam score (E); Class involvement (I)		- on-line examination (closed and open ended questions) - presenting team projects on selected marketing topics		N = 0,6E+0,4 I
Applications		Not the case		-		-
10.4 Minimum standard of performance						
N>5						

Course responsible
S.l. Veronica Maier

Head of department
Prof.dr.eng. Rodica Potolea

SYLLABUS

16. 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	49.2

17. Data about the subject

2.1	Subject name					Personal and professional development					
2.2	Subject area					Computer Science and Information Technology					
2.3	Course responsible/lecturer					Dipl. Psy. Dorin Stanciu PhD, Lecturer (ionut.stanciu@dppd.utcluj.ro)					
2.4	Teachers in charge of aapplications					Dipl. Psy. Dorin Stanciu PhD, Lecturer (ionut.stanciu@dppd.utcluj.ro)					
2.5	Year of study	IV	2.6	Semester	7	2.7	Assessment	Colloquium	2.8	Subject category	DC/OP

18. Estimated total time

Sem.	Subject name	Lecture	Applications			Lecture	Applications			Individual study	TOTAL	Credit
		[hours / week.]				[hours / semester]						
			S	L	P		S	L	P			
7	**Personal and professional development**	**2**	**-**	**-**	**-**	**28**	**-**	**-**	**-**	**48**	**76**	**3**

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	16
Supplementary study in the library, online and in the field	14
Preparation for seminars/laboratory works, homework, reports, portfolios, essays	14
Tutoring	-
Exams and tests	4
Other activities	-

3.7	Total hours of individual study	48
3.8	Total hours per semester	76
3.9	Number of credit points	3

19. Pre-requisites (where appropriate)

4.1	Curriculum	-
4.2	Competence	Baccalaureate level of instruction and general knowledge Beginner literacy with desktop applications, including Internet utilization

20. Requirements (where appropriate)

5.1	For the course	Auditorium or large lecture room. Audio-video installation for on-screen presentations (with room speakers). WiFi or cable Internet connectivity.
5.2	For the applications	Auditorium or large lecture room. Audio-video installation for on-screen presentations (with room speakers). WiFi or cable Internet connectivity. Writing board (classical or interactive) / Flip chart

6. Specific competences

Professional competences	**C5** - Design, lifecycle management, integration and integrity of hardware, software and communication systems (2 credits) **C5.1** - Specifying the relevant criteria regarding the lifetime cycle, quality, security and computing system's interaction with the environment and human operator **C5.2** - Using interdisciplinary knowledge for adapting an information system to application domain requirements **C5.3** - Using fundamental principles and methods for security, reliability and usability assurance of computing systems **C5.4** - Adequate utilization of quality, safety and security standards in information processing **C5.5** - Realization of a project including problem identification and analysis, design and development, while proving the understanding of the basic quality needs and requirements
Cross competences	**TC1 -** Honorable, responsible, ethical behavior, in the spirit of the law, to ensure the professional reputation (1 credit)

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

7.1	General objective	To provide the course graduate with a set of competencies, skills and level of knowledge about him/herself which allows the formation of a competitive advantage and to provide to course graduate with a better understanding of his/her current academic status and curriculum
7.2	Specific objectives	To facilitate domain-specific learning and knowledge acquisition by providing a larger perspective on personal and professional development; To enhance personal determination and academic engagement as a basis for future competitiveness; To allow the course graduate to acquire specific tools and skills needed for personal and professional assessment, engagement, planning, organizing, expression, and networking.

8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Key-concepts of personal and professional development. Self-concepts, qualities and virtues, self-awareness and self-knowledge (self-assessment versus external evaluations)	Interactive lectures: - Exposition - Discourse - Debating - Case studies - Problem-solving - Heuristic conversations - Role playing	
2	Motivation and self-determination. Goals, objectives, interests, needs, desires, ideals, aspirations, expectations and incentives.		
3	Learning and learning styles. Self-directed learning, adult learning and continuous learning (lifelong learning)		
4	Social modelling and key-persons/models. The basics of social learning and the significant others		
5	Rationality, control, self-regulation and decision making. Processes, strategies and decision making tools		
6	Critical thinking and scientific reasoning. Cognitive biases, logical fallacies and cognitive distortions		
7	Assertive communication, persuasion and negotiation		
8	Significant personal objectives: Qualities and virtues		
9	Significant personal and professional objectives: Health, safety, fulfilment, satisfaction and happiness		
10	Tools, means and methods for productivity enhancement: Strategic planning, Decision-making, Information management		
11	Tools, means and methods for productivity enhancement: Organization, scheduling, planning and budget management		
12	Tools, means and methods for productivity enhancement: CV building		

	(principles, alternatives, instruments)		
13	Tools, means and methods for productivity enhancement: Social networking, Professional networking (virtual dedicated networks and communities)		
14	Personal and professional development plans. Design and presentation		

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8.2. Applications (Seminars, Laboratory, Projects)		Teaching methods	Notes
1	N/A		
Bibliography			

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

By completing this course, the course graduate is expected to have acquired a series of specific and general declarative and procedural knowledge, as well as have built a series of competencies, which, in their togetherness contribute to an increased capacity to find employment, communicate professionally and informally, collaborate and work closely with other professionals and non-professional, and an increased ability to promote and capitalize upon personal and professional traits and activities.

10. Evaluation

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		Standardized written test with multiple choice questions.		Written test Duration: 1 hr.		60%
Applications		Collaborative and individual semester projects. Collaborative and individual homework. Assessment criteria include: accuracy/precision, completeness, fluency, and relevance		Individual portfolio		40%
10.4 Minimum standard of performance						
The total weighed score exceeds the equivalent of 5/10 of the final grade. Each assessment exceeds 50% of the allotted grading.						

Course responsible
Lecturer Dipl. Psy. Dorin Stanciu PhD

Head of department
Prof.dr.eng. Rodica Potolea