SYLLABUS

1. Data about the program of study

1.1 Institution	The Technical University of Cluj-Napoca
1.2 Faculty	Faculty of 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	50.

2. Data about the subject

2.1 Subject name				***Information Systems***	
2.2 Course responsible/lecturer				Assoc. prof. dr. eng. Ovidiu Pop – Ovidiu.Pop@cs.utcluj.ro	
2.3 Teachers in charge of seminars/ laboratory/ project				Assoc. prof. dr. eng. Ovidiu Pop – Ovidiu.Pop@cs.utcluj.ro	
2.4 Year of study	IV	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DS
	DI – Impusă, DOp – opțională, DFac – facultativă				DI

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminars		Laboratory	2	Project	
3.2 Number of hours per semester	56	of which:	Course	28	Seminars		Laboratory	28	Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										20
(b) Supplementary study in the library, online and in the field										10
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										5
(d) Tutoring										
(e) Exams and tests										5
(f) Other activities:										7

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	47
3.5 Total hours per semester (3.2+3.4)	103
3.6 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1 Curriculum	Software engineering, database design
4.2 Competence	Object-oriented design

5. Requirements (where appropriate)

5.1. For the course	50% (attendance)
5.2. For the applications	80% (attendance)

6. Specific competence

6.1 Professional competences	**C4 -** Improving the performances of the hardware, software and communication systems (1 credit) **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 (1 credit) **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 (2 credits) **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
6.2 Cross competences	N/A

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

7.1 General objective	Improve requirements management and design abilities of students in their senior year.
7.2 Specific objectives	Apply RUP metholologies for requirements management and design patterns

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Requirements Maturity Management	2		
RUP – Overview and Best Practices	2		
RUP –Iterative Development	2		
The Requirements Discipline	2		
Capturing Requirements: Use Cases (I)	2		
Capturing Requirements: Use Cases (II) – Best Practices	2		
Analysis Model Artifacts: Vision, Glossary, Supplementary Specification (I)	2		
Analysis Model Artifacts: Vision, Glossary, Supplementary Specification (II)	2		
Domain Model	2		
GRASP Design Patterns (I)	2		
GRASP Design Patterns (II)	2		
Use Case Realizations with GRASP Design Patterns (I)	2		
Use Case Realizations with GRASP Design Patterns (II)	2		
Use Case Realizations with GRASP Design Patterns (III)	2		
Bibliography 1. Craig Larman – Applying UML and Patterns (2003) 2. Alistair Cockburn – Writing Effective Use Cases (2002)			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Requirements Artifacts: Vision, Glossary, Supplementary	4	Students are	

Specification		encouraged to use their knowledge in implementation projects	
Generate a Vision document based on a RUP template	4		
Generate a Supplementary Specification document based on a RUP template	4		
Requirements Artifacts: Use Cases	4		
Generate a Use Case document based on a RUP template	4		
Generate an Analysis Model	4		
Lab Assessment	4		
Bibliography 1. Keneth Rubin – Essential Scrum (2012)			

**Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.*

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

The knowledge gained overlapping demands of all IT employers.

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course		Written exam	80%
Seminar			
Laboratory		Problem solving	20%
Project			
Minimum standard of performance: Proven understanding of requirements artifacts and ability to generate a design model. Grade calculus: 100% exam Conditions for participating in the final exam: Lab ≥ 5 Conditions for promotion: Grade ≥ 5			

Course responsible
Assoc. prof. dr. eng. Ovidiu Pop

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	Faculty of 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	51.1

2. Data about the subject

2.1 Subject name				***Knowledge-Based Systems***	
2.2 Course responsible/lecturer				Assoc.prof. dr. eng. Adrian Petru Groza – Adrian.Groza@cs.utcluj.ro	
2.3 Teachers in charge of seminars/ laboratory/ project				Assoc.prof. dr. eng. Anca Marginean Anca.Marginean@cs.utcluj.ro	
2.4 Year of study	IV	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DS
	DI – Impusă, DOp – opțională, DFac – facultativă				DOp

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminars		Laboratory	2	Project	
3.2 Number of hours per semester	56	of which:	Course	28	Seminars		Laboratory	28	Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										24
(b) Supplementary study in the library, online and in the field										14
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										5
(d) Tutoring										
(e) Exams and tests										4
(f) Other activities:										

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	47
3.5 Total hours per semester (3.2+3.4)	103
3.6 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1 Curriculum	Introduction to Artificial Intelligence, Intelligent Systems
4.3 Competence	Important material that you should have learned: first order logic, algorithm design, big-O complexity analysis, heuristic search, logic programming, machine learning, formal verification methods. Useful skills that you should have: Linux, Latex, Java, LISP and Prolog programming languages.

5. Requirements (where appropriate)

5.1. For the course	Each student is required to enrol on moodle platform. By enrolling in this course, each student assumes the responsibility of an active participant in lecture and applications.
5.2. For the applications	

6. Specific competence

6.1 Professional competences	**C3** - Problems solving using specific Computer Science and Computer Engineering tools (1 credit) **C3.1** Identifying classes of problems and solving methods that are specific to computing systems **C3.2** Using interdisciplinary knowledge, solution patterns and tools, making

	experiments and interpreting their results **C3.3** Applying solution patterns using specific engineering tools and mehods **C3.4** Comparatively and experimentaly evaluation of the alternative solutions for performance optimization **C3.5** Developing and implementing informatic solutions for concrete problems **C5 -**Designing, managing the lifetime cycle, integrating and ensuring the integrity of hardware, software and communication systems (1 credit) **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 the computing system to the specific requirements of the application field **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** 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) **C6.1** 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 **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
6.2 Cross competences	N/A

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

7.1 General objective	Understanding conceptual instrumentation for knowledge representation and reasoning
7.2 Specific objectives	Applying various knowledge-based techniques aiming to increase the quality of software systems

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Introduction: application case analysis, representative scenarios from different domains.	2	Slides, Warm-up examples, Quick individual work, Open discussions, Assignments, Round-up quizes	
Basic description logics: concepts, roles, instances, expressivity.	2		
Reasoning in description logics. Tableaux-based algorithms	2		
Description Logic Programs.	2		
Ontologies: formalisms, Semantic Web	2		
Ontology engineering: ontology design and evaluation	2		
Midterm assessment	2		
Rule-based systems: representation, reasoning methods.	2		
Non-monotonic reasoning	2		
Fuzzy systems: fuzzy sets, fuzzy inference, fuzzy expert systems	2		
Reasoning on knowledge: knowledge representation, epistemic logics	2		
Knowledge acquisition: conceptual knowledge, data mining, clustering.	2		
Model checking: computation tree logic	2		
Student presentation: ontology building competition	2		
Bibliography			

1. F. Baader, W. Nutt, Basic Description Logics, Handbook of Description Logics, Cambridge University Press, May 20, 2010
2. Grosof, Benjamin N., et al. "Description logic programs: Combining logic programs with description logic." *Proceedings of the 12th international conference on World Wide Web*. ACM, 2003.
3. Grigoris Antoniou and Frank van Harmelen, A Semantic Web Primer, second edition, MIT Press, 2008
4. Horridge, Matthew, Bijan Parsia, and Ulrike Sattler. "Explaining inconsistencies in OWL ontologies." *Scalable Uncertainty Management*. Springer Berlin Heidelberg, 2009. 124-137.
5. Andries P. Engelbrecht, Computational Intelligence An Introduction, second edition, Wiley, 2007
6. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to data mining, Addison-Wesley, 2006
7. Van Eijck and Verbrugge (eds.), Discourses on Social Software, Amsterdam University Press, 2009
8. Michael Huth and Mark Ryan,Logic in Computer Science- Modelling and reasoning about systems 2000; Cambridge University Press, 2000
9. Brachman, Ronald J., and Hector J. Levesque. "Knowledge representation and reasoning.." *Morgan Kaufmann Publishers,* 2004

8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Ontologies in KRSS syntax with RACER tool	2	Student engagement techniques, Examples, Deadlines	
Reusing ontologies	2		
Defining concepts	2		
Defining roles	2		
Populating ontologies	2		
Rules on top of ontologies	2		
Ontology design patterns	2		
Querying ontologies	2		
Integrating ontologies with other applications	2		
Debugging ontologies	2		
Ontology evaluation	2		
Documenting ontologies	2		
Ontology building competition	2		
Student presentations	2		

Bibliography

1. Groza - Ontology Engineering with RACER - an activity based approach, UTPress, 2014
2. Haarslev, Volker, and Ralf Möller. "RACER User s Guide and Reference Manual Version 1.7. 7." Concordia University and Univ. of Appl. Sciences in Wedel (2003).

**Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.*

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

Course organisation and its requiments follow the ACM guidelines and exemplary courses listed by ACM/IEEE Computer Science 2013 Exemplar-Fest
Employers in the field benefit from having a student more orietend towards increasing software quality.

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Understanding conceptual instrumentation for knowledge representation and reasoning, Class participation, Assignments	Midterm assessment, Writing exam	70%
Seminar			
Laboratory	Ontology evaluation metrics, Meeting deadlines, P\public presentation skills, Technical writing skills	Lab project assessment	30%

Project			
Minimum standard of performance: Understanding description logics, computational tree logic and rule-based systems. Meeting deadlines. Engineering a decent ontology. Grade calculus: 0.2 midterm+0.3 lab + 0.5 exam Conditions for participating in the final exam: Lab ≥ 5 Conditions for promotion: Grade ≥ 5			

Course responsible
Assoc.prof.dr.eng. Adrian Groza

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	Faculty of 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	51.2

2. Data about the subject

2.1 Subject name				***Parallel Programming***	
2.2 Course responsible/lecturer				Prof. dr. eng. Alin Suciu – alin.suciu@cs.utcluj.ro	
2.3 Teachers in charge of seminars/ laboratory/ project				Prof. dr. eng. Alin Suciu – alin.suciu@cs.utcluj.ro	
2.4 Year of study	IV	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DS
	DI – Impusă, DOp – opțională, DFac – facultativă				DOp

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminars		Laboratory	2	Project	
3.2 Number of hours per semester	56	of which:	Course	28	Seminars		Laboratory	28	Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										18
(b) Supplementary study in the library, online and in the field										12
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										13
(d) Tutoring										0
(e) Exams and tests										4
(f) Other activities:										0

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	47
3.5 Total hours per semester (3.2+3.4)	103
3.6 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1 Curriculum	Computer Programming (C), OO Programming (Java/C#), Logic Programming (Prolog), Operating Systems
4.4 Competence	All competences related to the above disciplines

5. Requirements (where appropriate)

5.1. For the course	Blackboard, Projector, Computer
5.2. For the applications	Multicore computers, Specific Software

6. Specific competence

6.1 Professional competences	**C3** - Problems solving using specific Computer Science and Computer Engineering tools (1 credit) **C3.1** Identifying classes of problems and solving methods that are specific to computing systems **C3.2** Using interdisciplinary knowledge, solution patterns and tools, making experiments and interpreting their results **C3.3** Applying solution patterns using specific engineering tools and mehods **C3.4** Comparatively and experimentaly evaluation of the alternative solutions for performance optimization

	C3.5 Developing and implementing informatic solutions for concrete problems **C5 -**Designing, managing the lifetime cycle, integrating and ensuring the integrity of hardware, software and communication systems (1 credit) **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 the computing system to the specific requirements of the application field **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** 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) **C6.1** 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 **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
6.2 Cross competences	N/A

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

7.1 General objective	Developing the ability to identify parallelism in a given problem, and to take advantage of this parallelism using various methods and technologies for parallel programming
7.2 Specific objectives	▪ Understanding the performance parameters of parallel algorithms ▪ Ability to implement parallel algorithms using multithreading technologies (in C, Java, C#, Prolog, OpenMP) ▪ Ability to implement parallel algorithms based on the VSM model (Linda) ▪ Ability to implement parallel algorithms based on message passing (PVM, MPI) ▪ Basic knowledge of the cutting edge developments in the field (Quantum Computing, DNA Computing)

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Introduction, Types of Parallelism, Classification, Applications	2	Lectures using blackboard and projector, interactive discussions	
Parallel Algorithms, Performance Parameters, Amdahl's Law, Gustafson's Law	2		
Processes (C/UNIX), Communication, Synchronization	2		
Threads (Java, C#, Prolog), Communication, Synchronization	2		
OpenMP (1)	2		
OpenMP (2)	2		
OpenMP (3)	2		
Linda, Parallelism based on Virtual Shared Memory	2		
Message Passing Programming, PVM, MPI	2		
Programming the Graphics Processor (GPU)	2		
Sorting Networks	2		
Cryptography and Cryptanalysis concepts	2		
Grid Computing, Cluster Computing	2		
Quantum Computing and DNA Computing	2		

Bibliography

1. Peter Pacheco, An Introduction to Parallel Programming, Morgan Kaufmann, 2011.
2. Barbara Chapman, Gabriele Jost and Ruud van der Pas, Using OpenMP - Portable Shared Memory Parallel Programming, MIT Press, 2007 (online).
3. I. Foster, Designing and Building Parallel Programs, Addison Wesley, 1995 (online).
4. L. Sterling, E. Shapiro, The Art of Prolog, MIT Press, 1994.

8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Imperative Programming in C – review, Solving highly parallelizable problems	2	Practical laboratory works / programming exercises using specific software tools	
Logic Programming in Prolog – review, Solving highly parallelizable problems	2		
Processes (C/UNIX)	2		
Threads (C)	2		
Threads (Java, C#)	2		
Threads (Prolog)	2		
Programming in OpenMP (1)	2		
Programming in OpenMP (2)	2		
Programming in OpenMP (3)	2		
Programming in Linda	2		
Programming in MPI	2		
Sorting Networks	2		
Cryptographic Algorithms	2		
Final Evaluation	2		

Bibliography

1. Peter Pacheco, An Introduction to Parallel Programming, Morgan Kaufmann, 2011.
2. Barbara Chapman, Gabriele Jost and Ruud van der Pas, Using OpenMP - Portable Shared Memory Parallel Programming, MIT Press, 2007 (online).
3. I. Foster, Designing and Building Parallel Programs, Addison Wesley, 1995 (online).
4. L. Sterling, E. Shapiro, The Art of Prolog, MIT Press, 1994.

**Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.*

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

The content of the course is aligned to the latest developments in the field and responds to both the development in the multicore / other parallel hardware technologies and the requirements coming from the industry.

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Knowledge assimilated from the course material, interactivity during lectures	Written exam (E)	70%
Seminar			
Laboratory	Ability to solve problem using parallel programming techniques and technologies	Laboratory assessment (L)	30%
Project			

Standard minim de performanţă:
Grade calculus: 30 % lab + 70 % final exam
Conditions for participating in the final exam: Lab ≥ 5
Conditions for promotion: final exam ≥ 5

Course responsible
Prof.dr.eng. Alin Suciu

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	Faculty of 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	52.1

2. Data about the subject

2.1 Subject name				***DataBase Design***	
2.2 Course responsible/lecturer				S.l. dr. eng. Călin Cenan – Calin.Cenan@cs.utcluj.ro	
2.3 Teachers in charge of seminars/ laboratory/ project				Conf. dr. eng. Delia Mitrea – Delia.Mitrea@cs.utcluj.ro	
2.4 Year of study	IV	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DS
	DI – Impusă, DOp – opțională, DFac – facultativă				DOp

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminars		Laboratory	2	Project	
3.2 Number of hours per semester	56	of which:	Course	28	Seminars		Laboratory	28	Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										12
(b) Supplementary study in the library, online and in the field										20
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										12
(d) Tutoring										1
(e) Exams and tests										2
(f) Other activities:										

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	47
3.5 Total hours per semester (3.2+3.4)	103
3.6 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1 Curriculum	Database
4.5 Competence	

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 competence

6.1 Professional competences	**C3 -** Problems solving using specific Computer Science and Computer Engineering tools (2 credits) **C3.1 -** Identifying classes of problems and solving methods that are specific to computing systems **C3.2 -** Using interdisciplinary knowledge, solution patterns and tools, making experiments and interpreting their results **C3.3 -** Applying solution patterns using specific engineering tools and mehods **C3.4 -** Comparatively and experimentaly evaluation of the alternative solutions

	for performance optimization **C3.5 -** Developing and implementing information system solutions for concrete problems **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
6.2 Cross competences	N/A

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

7.1 General objective	Developing general skills in databases design and database programming
7.2 Specific objectives	Assimilate theoretical knowledge on relational databases design and SQL language extensions Presentation of database transactions Getting practical skills for designing and programming databases

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Main steps to design a database; Data vs. Information	2	PDF & PPT Presentations; Demonstrations and model presentations on board; small exercises to increase interaction	
Historical roots of database ; Types of Databases	2		
Business Rules; Data Models: Hierarchical, Network, Relational, Entity-Relationship, Object Oriented	2		
Degrees of Data Abstraction; Conceptual Model; Internal Model; External Model; Physical Model	2		
Entity-Relationship concepts and terminology; Entity-Relationship diagrams; Tables; Keys, Attribute specifications; Data types; Data dictionary; Integrity constraints	2		
Relationships; Connectivity and Cardinality; Strength and Participation; Entity Supertypes and Subtypes	2		
Developing an ER Diagram; Optimization of Database – Normalization; Functional dependencies, 1NF, 2NF, 3NF, Boyce-Codd Normal Form (BCNF); 4NF, 5NF; Denormalization	2		
Constraints, Indexes; Data Definition Commands; Data Manipulation Commands	2		
Extended SQL – Transact-SQL; Writing Stored Procedures; Triggers	2		
Data / Information; Systems development life cycle: Planning, Analysis, Detailed Systems Design, Implementation	2		
Transaction Management and Concurrency Control; Transactions; Logs; Locks	2		
Data Warehouse - Need for Data Analysis; Decision Support Systems; Data Warehouse Architectures	2		
Facts, Dimensions, Attributes, Attribute Hierarchies; Data Mining	2		
Database administration; Security	2		
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. Peter Rob and Carlos Coronel - *Database Systems: Design, Implementation, and Management*, Crisp Learning, 2006
4. Rebecca M. Riordan - *Designing Relational Database Systems*, Microsoft Press, 1999
5. Matt Shepker - *Writing Stored Procedures for Microsoft SQL Server*, Sams, 2000
6. Mark Spenik and Orryn Sledge - *Microsoft SQL Server 2000 DBA Survival Guide*, Sams, 2001

8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Database and DataBase Management Systems - Microsoft SQL Server – Project domains	2	Exposure and applications	Computers, MS SQL Server, Oracle
Developing ER diagrams - Microsoft Visio	2		
Visio – SQL Server synchronization – First evaluation of project work: Domain analysis	2		
Design of Database Structures – Tables, Keys, Relationships	2		
Design of Database Structures – Indexes, Constraints, Views	2		
Update Data; Query Data - Second evaluation of project work: Database structures	2		
Simple Stored Procedures; Functions	2		
Stored Procedures - Cursors	2		
Triggers	2		
Transactions	2		
Data Warehouse	2		
Third evaluation of project work	2		
MS SQL Server administration	2		
Final laboratory evaluation - Final project evaluation	2		

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. Peter Rob and Carlos Coronel - *Database Systems: Design, Implementation, and Management*, Crisp Learning, 2006
4. Matt Shepker - *Writing Stored Procedures for Microsoft SQL Server*, Sams, 2000
5. Mark Spenik and Orryn Sledge - *Microsoft SQL Server 2000 DBA Survival Guide*, Sams, 2001

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

Database Design is an advanced topic in Computer Engineering and Information Technology field, combining fundamental aspects and practical software tools. Explaining to students the principles of database designing and database programming. Course content it is similar to database courses in other universities in the country and abroad.

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Solving 4 problems and answers to questions of theory	2.5 hours written evaluation	60%
Seminar			
Laboratory	Implementing an application	Ongoing evaluation and a final presentation	40%
Project			

Minimum standard of performance:
Solving practical laboratory work and projects, designing databases and a database programming; solving the problems and other subjects presented at the examination.
Grade calculus: 50% lab + 50% final exam
Conditions for participating in the final exam: Lab ≥ 5
Conditions for promotion: final exam ≥ 5

Course responsible
Lect.dr.eng. Calin Cenan

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	Faculty of 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	52.2

2. Data about the subject

2.1 Subject name				***Computer Network Design***	
2.2 Course responsible/lecturer				Assoc. Prof. dr. eng. Emil-Ioan Cebuc – Emil.Cebuc@cs.utcluj.ro	
2.3 Teachers in charge of seminars/ laboratory/ project				Lect. Dr. Eng. Bogdan Iancu – Bogdan.Iancu@cs.utcluj.ro	
2.4 Year of study	IV	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DS
	DI – Impusă, DOp – opțională, DFac – facultativă				DOp

3. Estimated total time

3.1 Number of hours per week	4	of which:	Course	2	Seminars		Laboratory	2	Project	
3.2 Number of hours per semester	56	of which:	Course	28	Seminars		Laboratory	28	Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										15
(b) Supplementary study in the library, online and in the field										15
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										12
(d) Tutoring										2
(e) Exams and tests										3
(f) Other activities:										0
3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))										47
3.5 Total hours per semester (3.2+3.4)										103
3.6 Number of credit points										4

4. Pre-requisites (where appropriate)

4.1 Curriculum	Local Area Networks, 7-th semester
4.6 Competence	LAN protocols, LAN structure, LAN services

5. Requirements (where appropriate)

5.1. For the course	Projector, Blackboard, lecture room
5.2. For the applications	PC with Linux/Windows OS, Switches, routers, hardware tools, cable tester

6. Specific competence

6.1 Professional competences	**C3 -** Problems solving using specific Computer Science and Computer Engineering tools (2 credits) **C3.1 -** Identifying classes of problems and solving methods that are specific to computing systems **C3.2 -** Using interdisciplinary knowledge, solution patterns and tools, making experiments and interpreting their results **C3.3 -** Applying solution patterns using specific engineering tools and mehods **C3.4 -** Comparatively and experimentaly evaluation of the alternative solutions for performance optimization **C3.5 -** Developing and implementing information system solutions for concrete

	problems **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
6.2 Cross competences	N/A

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

7.1 General objective	Knowledge and understanding of networking techniques, protocols and services
7.2 Specific objectives	Able to design simple network protocol at different OSI layer, able to configure networking devices at basic level

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Introduction	2	Lecture, using PowerPoint presentation	
ISO-OSI an TCP/IP Reference models + Layered structure, analogies and differences	2		
Physical Layer + layer functions	2		
Data link Layer + layer function, HDLC protocol	2		
Network Layer + layer function and routing, IPv4 and IPv6	2		
Transport Layer + connection oriented and connection less protocols	2		
Upper Layers + session, presentation and application layers	2		
Multiplexing + FDM, TDM, statistical TDM	2		
Packet and circuit switching, virtual circuits + Analogies, differences and switches	2		
Flow control and congestion control + Stop and Wait, sliding window, token bucket	2		
Distributed network services like E-mail, DNS, etc.	2		
Network security + Threats and their avoidance	2		
Cryptographic systems+ symmetrical and asymmetrical systems	2		
Computer Network management + management application structure	2		
Bibliography 1. A. S. Tanenbaum, Computer Networks; 2. W. Stallings; Data and Computer Communications; Prentice Hall 2000			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Sub netting and Super netting	2	Individual and team work Interactive tutoring Learn by example	
Virtual LAN's VLAN	2		
Easy IP: DHCP,NAT	2		
DNS	2		
Static routing	2		
Dynamic routing	2		
Security	2		
Protocol Inspector II	2		
Network Inspector	2		
Application layer protocols	2		

Wireless I	2		
Wireless II	2		
Wireless IÎÎ	2		
Lab colloquium	2		

Bibliography

1. E. Cebuc et all, Computer Network Design Lab Guide, Editura UT Press 2005
2. Presentations can be found at: ftp.utcluj.ro/pub/users/cemil/prc

*Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.

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

Course content is according to leading textbooks, lab content is inspired from CCNA industry certification level.

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Understands and explains network protocols, designs simple network Basic knowledge of network security and management.	Written exam Problem solving Theory Admittance conditioned by successful lab colloquium	40% Theory 30% Problem
Seminar			
Laboratory	Is able to configure networking devices at basic level	Lab colloquium	30%
Project			

Minimum standard of performance:
Understands protocol stacks, flow and congestion control, network security and management issues. Configures switches and routers.
Grade calculus: 30% lab + 70% final exam
Conditions for participating in the final exam: Lab ≥ 5
Conditions for promotion: final exam ≥ 5

Course responsible
Assoc.dr.eng. Emil Cebuc

Head of department
Prof.dr.eng. Rodica Potolea

SYLLABUS

1. Data about the program of study

1.1 Institution	The Technical University of Cluj-Napoca
1.2 Faculty	Faculty of 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	53.

2. Data about the subject

2.1 Subject name				***Project Management***	
2.2 Course responsible/lecturer				Prof. dr. eng. Mihaela Dinsoreanu, mihaela.dinsoreanu@cs.utcluj.ro	
2.3 Teachers in charge of seminars/ laboratory/ project					
2.4 Year of study	IV	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DS
	DI – Impusă, DOp – opțională, DFac – facultativă				DI

3. Estimated total time

3.1 Number of hours per week	2	of which:	Course	2	Seminars		Laboratory		Project	
3.2 Number of hours per semester	28	of which:	Course	28	Seminars		Laboratory		Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										15
(b) Supplementary study in the library, online and in the field										15
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										3
(d) Tutoring										13
(e) Exams and tests										3
(f) Other activities:										

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	49
3.5 Total hours per semester (3.2+3.4)	77
3.6 Number of credit points	3

4. Pre-requisites (where appropriate)

4.1 Curriculum	Software Engineering
4.7 Competence	

5. Requirements (where appropriate)

5.1. For the course	Video projector (compulsory), internet connected computer (optional)
5.2. For the applications	-

6. Specific competence

6.1 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 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
6.2 Cross competences	N/A

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

7.1 General objective	Understand and apply appropriate project management techniques
7.2 Specific objectives	• Acknowledge the interfaces and interdependencies between the disciplines in OOSE • Present various project management techniques and their application in the two prominent methodologies • Project Management Metrics and Indicators • Understand the risks and the factors that lead to success or failure; Risk Management • Reflections of Project Management on the Software Quality

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Introduction	2	Face to face lectures, Powerpoint slides	
PM overview	2		
Basics of Project Management for Agile Methodologies	2		
Basics of Project Management for Plan-driven Methodologies	2		
Planning and Tailoring the process	2		
Planning the Disciplines	2		
WBS development	2		
Time management	2		
Monitoring and Control	2		
Risk management	2		
Change management	2		
Resource management	2		
People management	2		
Project closure and final review	2		

Bibliography

5. Project Management Institute, A Guide to the Project Management Body of Knowledge, 5th Edition, 2013.
6. Juana Clark Craig, Project Management Lite: Just Enough to Get the Job Done…Nothing More, 2012
7. The Unified Software Development Process (Hardcover) Grady Booch, James Rumbaugh, Ivar Jacobson, Addison Wesley, 1998.
8. Software Project Management: A Unified Framework, Walker Royce, Addison Wesley
9. Planning Extreme Programming, Kent Beck, Addison Wesley, 2000

8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
-			

Bibliography

-

**Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.*

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

ACM Curriculum compliant course.

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course	Ability to apply appropriate PM techniques for given project situations	Written Exam	100%

Seminar			
Laboratory			
Project			
Minimum standard of performance: Grade calculus: 100% final exam Conditions for participating in the final exam: Attendance of lectures >= 50% Conditions for promotion: final exam ≥ 5			

Course responsible
Prof.dr.eng. Mihaela Dinsoreanu

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	Faculty of 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	54.

2. Data about the subject

2.1 Subject name				***Project Elaboration Methodology***	
2.2 Course responsible/lecturer				Conf.dr.ing.Tudor Muresan - Tudor.Muresan@cs.utcluj.ro	
2.3 Teachers in charge of seminars/ laboratory/ project				-	
2.4 Year of study	IV	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	C
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DS
	DI – Impusă, DOp – opțională, DFac – facultativă				DI

3. Estimated total time

3.1 Number of hours per week	2	of which:	Course	2	Seminars		Laboratory		Project	
3.2 Number of hours per semester	28	of which:	Course	28	Seminars		Laboratory		Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										18
(b) Supplementary study in the library, online and in the field										4
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										
(d) Tutoring										
(e) Exams and tests										4
(f) Other activities:										

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	24
3.5 Total hours per semester (3.2+3.4)	52
3.6 Number of credit points	2

4. Pre-requisites (where appropriate)

4.1 Curriculum	
4.8 Competence	

5. Requirements (where appropriate)

5.1. For the course	
5.2. For the applications	

6. Specific competence

6.1 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
6.2 Cross competences	N/A

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

7.1 General objective	1. Ability to write a project proposal 2. Ability to search literature and critical evaluation 3. Ability to use related work and technical reports 4. Ability to write literature reviews 4. Ability to write project documentation 5. Ability for oral presentation
7.2 Specific objectives	

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Introduction - Computing project types	2	Using modern teaching methods and internet acces	
Choosing the project	2		
Preparing a project proposal	2		
Research and research process	2		
Research methods	2		
Literature search and review	2		
The report	2		
Structuring the report	2		
Writing the report	2		
Citing and reference management	2		
Reference styles	2		
Presenting and discussions on outstanding projects	2		
Oral presentation	2		
The talk and the defense	2		
Bibliography 1. Dawson, C.W. - Projects in Computing and Information Systems, Addison Wesley 2005 2. B. Olsson, M. Berndtsson, B. Lundell - Running Research-Oriented Final Year Projects for CS and IS Students, ACM SIGSE 2003 3. V. Bouki - Undergraduate Computer Science Projects in UK: What is the point?, Proc. of Informatics Education Europe II Conference, IEEII 2007			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Bibliography			

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

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course		Colloquium	100%
Minimum standard of performance: Grade calculus: 100% final exam Conditions for participating in the final exam: Attendance of lectures >= 50% Conditions for promotion: final exam ≥ 5			

Course responsible
Assoc.prof.dr.eng. Tudor Muresan

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	Faculty of 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	55.

2. Data about the subject

2.1 Subject name				***Communication protocols and networks project***	
2.2 Course responsible/lecturer				Assoc. Prof. dr. eng. Emil Cebuc	
2.3 Teachers in charge of seminars/ laboratory/ project				Assoc.prof. dr. eng. Adrian Peculea, Lect. dr. eng. Bogdan Iancu	
2.4 Year of study	IV	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	C
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DS
	DI – Impusă, DOp – opțională, DFac – facultativă				Di

3. Estimated total time

3.1 Number of hours per week	2	of which:	Course		Seminars		Laboratory		Project	2
3.2 Number of hours per semester	28	of which:	Course		Seminars		Laboratory		Project	28
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										
(b) Supplementary study in the library, online and in the field										20
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										
(d) Tutoring										
(e) Exams and tests										4
(f) Other activities:										

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	24
3.5 Total hours per semester (3.2+3.4)	52
3.6 Number of credit points	2

4. Pre-requisites (where appropriate)

4.1 Curriculum	Local Area Networks, 7-th semester
4.9 Competence	LAN protocols, LAN structure, LAN services

5. Requirements (where appropriate)

5.1. For the course	N/A
5.2. For the applications	Classroom, PC with internet access

6. Specific competence

6.1 Professional competences	**C5** Designing, managing the lifetime cycle, integrating and ensuring the integrity of hardware, software and communication systems (1 credit) **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 an information system to application domain requirements **C5.3** Using fundamental principles and methods for ensuring the security, the safety and ease of exploitation of the computing systems **C5.4 -** Adequate utilization of quality, safety and security standards in

	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
6.2 Cross competences	**CT2** Identifying, describing and conducting processes in the projects management field, assuming different roles inside the team and clearly and concisely describing, verbally or in writing, in Romanian and in an international language, the results from the activity field. (1 credit)

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

7.1 General objective	Teamwork, working with partial and contradicting specifications
7.2 Specific objectives	A team of 3-4 students is able to design a medium size LAN

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
-			
Bibliography -			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Introduction, team setup, project requirements and specifications	4	Brief presentation of possible solutions Refinement of project specifications	
Project design stage 1	4		
Project design stage 2	4		
Project design stage 3	4		
Project documentation 1	4		
Project documentation 2	4		
Project presentation and colloquium	4		
Bibliography 1. Packet Tracer user manual 2. OpNet user Manual 3. Equipment data sheet available on Internet, specific to each equipment selected by students			

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

Project content is kept state of the art by using latest devices available on the market .

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course			
Seminar			
Laboratory			
Project	Submitted project fulfils requirements	Each project is evaluated individually	90% 10% activity during the face2face hours
Minimum standard of performance: Students are able to select proper networking devices to fulfil design specifications. Students are able to configure equipment in a Packet Tracer simulation to fulfil specific functions. Grade calculus: 100% final exam Conditions for participating in the final exam: maxim o absenta la orele de proiect, etapele intermediare ale proiectului predate la termenele stabilite. Conditions for promotion: grade ≥ 5			

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

Head of department
Prof.dr.eng. Rodica Potolea

SYLLABUS

1. Data about the program of study

1.1 Institution	The Technical University of Cluj-Napoca
1.2 Faculty	Faculty of 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	56.

2. Data about the subject

2.1 Subject name				***Research and development activity***	
2.2 Course responsible/lecturer				Diploma project supervisor	
2.3 Teachers in charge of seminars/ laboratory/ project				As decided by the supervisor	
2.4 Year of study	IV	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	V
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DS
	DI – Impusă, DOp – opțională, DFac – facultativă				DI

3. Estimated total time

3.1 Number of hours per week	8	of which:	Course		Seminars		Laboratory		Project	8
3.2 Number of hours per semester	112	of which:	Course		Seminars		Laboratory		Project	112
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										
(b) Supplementary study in the library, online and in the field										120
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										
(d) Tutoring										
(e) Exams and tests										2
(f) Other activities:										

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	122
3.5 Total hours per semester (3.2+3.4)	234
3.6 Number of credit points	9

4. Pre-requisites (where appropriate)

4.1 Curriculum	
4.10Competence	

5. Requirements (where appropriate)

5.1. For the course	
5.2. For the applications	

6. Specific competence

6.1 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 (2 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
6.2 Cross competences	**CT1** Honorable, responsible, ethical behavior, in the spirit of the law, in order to ensure the professional reputation (1 credit) **CT2** Identifying, describing and conducting processes in the projects management field, assuming different roles inside the team and clearly and concisely describing, verbally or in writing, in Romanian and in an international language, the results from the activity field. (1 credit) **CT3** Demonstrating the spirit of initiative and action for updating professional, economical and organizational culture knowledge (1 credit)

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

7.1 General objective	
7.2 Specific objectives	

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Bibliography -			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
• Establish the topic of the diploma project • Establish the main chapters of the diploma thesis • Documentation on the topic of the diploma thesis • Write a synthesis of the bibliographic study			
Bibliography To be established by the supervisor of the diploma thesis.			

**Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.*

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

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the

			final grade
Course			
Seminar			
Laboratory			
Project		The examination consists of the verification of the preliminary contents of the diploma work and the verification of the synthesis of the bibliographic study.	100%
Minimum standard of performance: Note=5			

Course responsible
Diploma project supervisor

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	Faculty of 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	57.

2. Data about the subject

2.1 Subject name				***Practical placement for diploma thesis***	
2.2 Course responsible/lecturer				Diploma project supervisor	
2.3 Teachers in charge of seminars/ laboratory/ project				As decided by the supervisor	
2.4 Year of study	IV	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	V
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DS
	DI – Impusă, DOp – opțională, DFac – facultativă				DI

3. Estimated total time

3.1 Number of hours per week	-	of which:	Course		Seminars		Laboratory		Project	
3.2 Number of hours per semester	-	of which:	Course		Seminars		Laboratory		Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										20
(b) Supplementary study in the library, online and in the field										8
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										30
(d) Tutoring										
(e) Exams and tests										2
(f) Other activities:										
3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))										60
3.5 Total hours per semester (3.2+3.4)										60
3.6 Number of credit points										2

4. Pre-requisites (where appropriate)

4.1 Curriculum	
4.11Competence	

5. Requirements (where appropriate)

5.1. For the course	
5.2. For the applications	

6. Specific competence

6.1 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
6.2 Cross competences	N/A

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

7.1 General objective	Elaboration of the diploma thesis.
7.2 Specific objectives	To achieve these general objectives, students will integrate the research results in a paper to comply with the requirements of the department.

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Bibliography			
8.2 Applications – Seminars/Laboratory/Project	Hours	Teaching methods	Notes
Bibliography For the diploma thesis preparation, the references are those recommended by the supervisor, as well as those obtained by studying the bibliography. For fundamental and specific knowledge assessment, the bibliography is identical to the minimal bibliography for the each of the undergraduate courses			

**Se vor preciza, după caz: tematica seminariilor, lucrările de laborator, tematica și etapele proiectului.*

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

Since this topic is important for the development of a quality diploma, its content aligns the research/ design/ development topics at the European and worldwide level. The content of the course has been discussed with key actors in this area (from both the academic and industry environment).

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course			
Seminar			
Laboratory			
Project	diploma thesis	diploma thesis	100%
Minimum standard of performance: diploma thesis			

Course responsible
Diploma project supervisor

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	Faculty of 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	58.

2. Data about the subject

2.1 Subject name				***Defense of Diploma Thesis***	
2.2 Course responsible/lecturer				Diploma project supervisor	
2.3 Teachers in charge of seminars/ laboratory/ project				As decided by the supervisor	
2.4 Year of study	IV	2.5 Semester	2	2.6 Type of assessment (E - exam, C - colloquium, V - verification)	E
2.7 Subject category	*DF – fundamentală, DD – în domeniu, DS – de specialitate, DC – complementară*				DS
	DI – Impusă, DOp – opțională, DFac – facultativă				DI

3. Estimated total time

3.1 Number of hours per week	-	of which:	Course		Seminars		Laboratory		Project	
3.2 Number of hours per semester	-	of which:	Course		Seminars		Laboratory		Project	
3.3 Individual study:										
(a) Manual, lecture material and notes, bibliography										
(b) Supplementary study in the library, online and in the field										
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays										
(d) Tutoring										
(e) Exams and tests										
(f) Other activities:										

3.4 Total hours of individual study (suma (3.3(a)…3.3(f)))	
3.5 Total hours per semester (3.2+3.4)	
3.6 Number of credit points	10

4. Pre-requisites (where appropriate)

4.1 Curriculum	Graduating all previous disciplines from the curricula
4.12Competence	

5. Requirements (where appropriate)

5.1. For the course	
5.2. For the applications	

6. Specific competence

6.1 Professional competences	Graduates will have the following specific skills: • modeling and designing software and hardware sub-systems, making the best decisions regarding the costs-results trade-off concerning the design decisions • implementing a hardware or software system • analyzing the way a computing system meets the criteria for which it was designed and proposing improvements and future developments • demonstrating the knowledge and understanding of important concepts, principles and theories of computer science and engineering • identifying and analyzing specific problems and elaborating strategies for

	solving them • assuring the quality of products and services in the field of information technology using the information technology tools
6.2 Cross competences	N/A

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

7.1 General objective	Defense of Diploma Thesis
7.2 Specific objectives	

8. Contents

8.1 Lectures	Hours	Teaching methods	Notes
Bibliography			
8.2 Applications – Seminars/Laboratory/Project	**Hours**	**Teaching methods**	**Notes**
• study of the bibliography in order to see how actual and necessary the project is • comparative analysis of the existing products and systems • comparative analysis of the potential methodologies and/or technologies • preparation of the project specifications • implementation and deployment of the hardware or software system • product testing and validation • product documenting • assessment of results, possible further developments, original aspects, advantages and limits of solution			
Bibliography For the diploma thesis preparation, the references are those recommended by the supervisor, as well as those obtained by studying the bibliography. For fundamental and specific knowledge assessment, the bibliography is identical to the minimal bibliography for the each of the undergraduate courses.			

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

10. Evaluation

Activity type	Assessment criteria	Assessment methods	Weight in the final grade
Course			
Seminar			
Laboratory			
Project		Separate marks - for the diploma presentation and defending (P) - for the assessment of fundamental and specific knowledge (K)	100%
Minimum standard of performance: Exam average mark: M = (P + K) / 2 Condition to get the credits: P ≥ 5,00 ; K ≥ 5,00; M ≥ 6,00			

Course responsible
Diploma project supervisor

Head of department
Prof.dr.eng. Rodica Potolea