„Politehnica" University of Timişoara
Faculty of Automation and Computers
Department of Computers

Domain of study: **Computers and Information Technology**
Study programme: **Computers**

Syllabus
for the course
"Logic and Discrete Structures"

Type of course: mandatory
Study level: license
Year of study: I
Semester: 1

Course instructor: Prof.dr.eng. Marius Crisan

Number of hours/week / Evaluation / Credits					
Course	Seminary	Laboratory	Project	Evaluation	Credits
28	28	0	0	E	4

A. **Course objectives:** The course deals with objects such as integers, propositions, sets, relations and functions, which are all discrete and needed in the study of computer science. At the end of this course students should be able to understand concepts associated with discrete objects, their properties, and relationships among them and others. Students will obtain those skills that are used in solving abstract and concrete problems encountered in the design and practice of computer science and engineering.

B. **Prerequisites:** No prerequisites are required.

C. **Specific competences**

Code	Content of competences	Percen-tage	Credits
Professional competences:			
C1	Operating with fundamentals of sciences, engineering, and computer science	60	1.8
C2	Designing hardware, software and communication components	0	0
C3	Problem solving using the instruments of computer science and engineering	40	1.2
C4	Improving the performance of hardware, software and communication systems	0	0
C5	Designing, managing the lifecycle, integration and integrity of hardware, software and communication systems	0	0
C6	Designing intelligent systems	0	0
Transversal competences:			
CT1	Honorable, responsible and ethical behavior, in the spirit of the law, ensuring the reputation of the profession	0	0
CT2	Identifying, describing and executing project management processes, taking on different team roles, and describing clearly and concisely, orally and in writing, in English, results from one's activity domain	0	0
CT3	Demonstrating initiative and engaging in updating one's professional, economic and organizational knowledge	0	0
	Total	100	3

D. **Course subjects**

a) Course

Chapter	Content	Hours
1. Introduction	1.1. Statements and Truth Tables 1.2. Numbers and Divisibility 1.3. Proof Techniques	2
2. Sets	2.1. Definition of a Set 2.2. Operations on Sets 2.3. Counting finite Sets 2.4. Bags (Multisets)	4
3. Ordered Structures	3.1. Tuples	4

	3.2. Lists 3.3. Strings and Languages 3.4. Relations 3.5. Counting tuples	
4. Graphs and Trees	4.1. Definition of a Graph 4.2. Paths in Graphs 4.3. Graph Traversals 4.4. Trees 4.5. Spanning Trees	6
5. Functions	5.1. Definitions and Examples 5.2. Constructing Functions 5.3. Properties of Functions 5.4. Countability	2
6. Traditional Logic	6.1. Aristotelian Logic 6.2. Types of Reasoning 6.3. Syllogisms	2
7. Propositional Logic	7.1. Propositional Calculus 7.2. Formal Reasoning 7.3. Applications	4
8. Predicate Logic	8.1. First-Order Predicate Calculus 8.2. Equivalent Formulas 8.3. Formal Proofs in Predicate Calculus	4
	Total (hours)	28

b) Applications subject

Application type (Practice)	Content	Hours
1.	Operations on Sets, Tuples and Lists	6
2.	Paths in Graphs	2
3.	Graph Traversals	2
4.	Spanning Trees	4
5.	Functions	2
6.	Propositional Logic Problems	6
7.	Predicate Logic Problems	6
	Total (hours)	28

E. **Evaluation procedure**

The evaluation consists of a written exam and a seminar quiz. The written exam consists of multiple choice questions and answers upon the theoretical part of the course, and weights 66% of the total grade. Seminar work consists of a solving problem quiz, and weights 34% of the total grade. Minimum performance standard is to assimilate the basic scientific knowledge of computability and elements of complexity that contribute to problem solving. Minimum performance standard is to prove the understanding of the scientific knowledge of fundamental logical calculus and discrete structures that contribute to problem solving.

F. **Used Methodology**

The teaching strategy uses a type of deductive-inductive learning that is conducted semi-independently. Expository method is used, also encouraging interactivity. Taught concepts are introduced from simple to complex in a logical concatenation, based on knowledge already assimilated. The course is in electronic format and presented with video projector. Seminar work is primarily inductive in nature and contributes to deepening the course knowledge.

G. **References**

1. J.L. Hein, *Discrete Structures, Logic, and Computability*, Third edition, Jones and Bartlett Publ. 2010
2. Kenneth H. Rosen, *Discrete Mathematics and Its Applications*, 5th edition, McGraw-Hill, 2002.

H. **International compatibility**

1. Massachusetts Institute of Technology: Discrete structures: modular arithmetic, graphs, state machines, counting.
2. University of Leicester: Logic and Discrete Structures
3. Stanford University: Discrete Structures

Date: 2013, September 2nd

Head of Department

Prof. dr. ing. Vladimir-Ioan Creţu

Course instructor,

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