COURSE DESCRIPTION

1. Program Information

1.1 University	**Alexandru Ioan Cuza University of Iași**
1.2 Faculty	**Computer Science**
1.3 Department	**Computer Science**
1.4 Study Domain	**Computer Science**
1.5 Study Cycle	**Bachelor**
1.6 Study Program / Qualification	**Computer Science / Licentiate in Computer Science**

2. Course Information

2.1 Course Name			**Logic for computer Science**				
2.2 Course Instructor			**Dr. Ștefan Ciobâcă**				
2.3 Tutorial Class Instructor			**Dr. Ștefan Ciobâcă**				
2.4 Study Year	**I**	**2.5** Semester	**2**	**2.6** Evaluation	**E**	**2.7** Course Status*	**OB**

* *OB – Compulsory / OP – Optional*

3. Total estimated hours (hours per semester and didactic activities)

3.1 Hours per week	**4**	of which: **3.2** lecture	**2**	**3.3** tutorial/laboratory class	**2**
3.4 Hours in curriculum	**56**	of which: **3.5** lecture	**28**	**3.6** tutorial/laboratory class	**28**

Time Distribution	hours
Study of textbook, lecture notes, bibliography, and others	**14**
Supplementary documentation in the library, in electronic forums, and on the field	**28**
Preparation of tutorial/laboratories classes, homework, reports, portfolios and essays	**82**
Tutoring	-
Evaluation	**4**
Other activities	-

3.7 Total hours of individual study	**124**
3.8 Total hours per semester	**180**
3.9 Credits	**6**

4. Preconditions (if any)

4.1 Curriculum	**-**
4.2 Skills	**Ability to correctly understand a text, ability to express oneself, basic knowledge of mathematics**

5. Conditions (if any)

5.1 Course Operation	The students must be respectful, quiet and pay attention. The lectures will be held onsite. Discussions will be held on the Discord channel.
5.2 Tutorial/Laboratory Class Operation	The students must be respectful, quiet and pay attention. The seminar will be held onsite. Discussions will be held on the Discord channel. The onsite seminars will take place while respecting strict precautionary measures.

6. Specific Skills Acquired

Professional Skills	**C1.** Understands the concepts related to logic în computer science: syntax, semantics, normal forms, deductive systems, resolution. **C2.** Understands propositional logic and first-order logic.
Transversal Skills	CT1. The ability to abstract and think critically. CT2. The ability to coherently write down a solution.

7. Course Objectives (from the grid of specific skills acquired)

7.1 General Objectives	To understand the main concepts in Logic, as applied in Computer Science.
7.2 Specific Objectives	After successfully passing the exam, the students will be able to: - identify and build syntactically correct formulae; - translate propositions from natural language to propositional logic or first-order logic; - explain the difference between propositional logic and first-order logic; - reason semantically about the satisfiability/validity of a formula and about semantical consequences/equivalences; - use deductive systems such as resolution and natural deduction for mechanical proofs.

8. General Description

8.1	Course	Teaching Methods	**Observations** (hours and bibliographic references)

1.	Organization. Introduction. Informal Propositional Logic.	Discussions.	2
2.	The Syntax of Propositional Logic.	Lecture	2
3.	The Semantics of Propositional Logic	Lecture	2
4.	Additional semantic notions. Natural Deduction – Part I	Lecture	2
5.	Natural Deduction – Part II	Lecture	2
6.	Normal Forms.	Lecture	2
7.	Resolution	Lecture	2
8.	Exam week	Evaluation	-
9.	Syntax of First-Order Logic	Lecture	2
10.	Semantics of First-Order Logic	Lecture	2
11.	Natural Deduction	Lecture	2
12.	Normal Forms 1	Lecture	2
13.	Normal Forms 2	Lecture	2
14.	Resolution	Lecture	2

Bibliography

Main references:

- Ștefan Ciobâcă, Andrei Arusoaie, Rodica Condurache, Cristian Masalagiu. Logic for ComputerScience – Lecture Notes. Available online at https://logicincs.github.io/. To print in color.

Supplementary references:

- *Open Logic Project.*
  - *Propositional Logic: http://builds.openlogicproject.org/content/propositional-logic/propositional-logic.pdf*
  - *First-order logic: http://builds.openlogicproject.org/content/first-order-logic/first-order-logic.pdf*
- *P. D. Magnus - forall x - An Introduction to Formal Logic*
- *C. Masalagiu – Fundamentele logice ale Informaticii, Ed. Universității „Al. I. Cuza”, Iași, 2004, ISBN 973-703-015-X.*
- *C. Cazacu, V. Slabu – Logica matematică, Ed. „Ștefan Lupașcu”, Iași, 1999, ISBN 973-99044-0-8.*
- *M. Huth, M. Ryan – Logic in Computer Science: Modelling and Reasoning about Systems, Cambridge University Press, 2000, ISBN 0-521-65200-6. http://en.wikibooks.org/wiki/Logic_for_Computer_Scientists*
- *U. Schoening – Logic for Computer Scientists, Ed. Birkhauser, 1989. http://www.cs.umb.edu/*

8.2	**Tutorial / Laboratory Class**	**Teaching methods**	**Observations** (hours and bibliographic references)
1.	Organisation.	Discussions.Exercises.	2
2.	Exercise sheet.	Review of the topics presented at the lecture, proposing a set of exercises, individual work, interactive methods on the board.	2
3.	Exercise sheet.	Idem	2
4.	Exercise sheet.	Idem	2
5.	Exercise sheet.	Idem	2
6.	Exercise sheet.	Idem	2
7.	Exercise sheet.	Idem	2
8.	Exam week	Evaluation	2
9.	Exercise sheet.	Review of the topics presented at the lecture, proposing a set of exercises, individual work, interactive methods on the board.	2
10.	Exercise sheet.	Idem	2
11.	Exercise sheet.	Idem	2
12.	Exercise sheet.	Idem	2
13.	Exercise sheet.	Idem	2
14.	Exercise sheet.	Idem	2
Bibliography *No extra bibliography.*			

9. Course content synchronization with the expectations of the community representatives, professional associations and employers from the program domain

The course is a fundamental subject, which promotes critical thinking and lays the bases of understanding other subjects (databases, program verification, programming languages, algorithms et al.).

10. Evaluation

Activity Type	**10.1 Evaluation criteria**	**10.2 Evaluation methods**	**10.3 The weight of each evaluation form (%)**
10.4 Lecture	Quality of the answers.	50% - week 8*:* written test or *take home exam (depending on the existing restrictions, resources and the epidemiological status)* *50%* - examination period*:* written test or *take home exam (depending on the existing restrictions, resources and the epidemiological status)* The final grade is computed according to the statistical distribution of the obtained points.	100%
10.5 Tutorial/ Laboratory Class	Quality of the proposed solutions.	Assessment of classroom activity; Top answers; Active participation.	Bonus (at most 20%)
10.6 Minimal standards to pass			
The ability to identify syntactically correct formulae; The ability to translate propositions from natural language into propositional logic/first-order logic; The ability to prove, using a semantical-level reasoning process, the (un)satisfiability/(in)validity of formulae, semantical consequences/equivalences; The ability to find mechanical proofs (using natural deduction/resolution) for proving validity/unsatisfiability/equivalences/semantical consequences; The ability to write down a solution coherently (the structure of the solution, the quality of the wording, the logical flow of ideas).			

Date	Lecturer	Tutorial/Laboratory Instructor
14.09.2023	Conf. Dr. Ștefan Ciobâcă	Conf. Dr. Ștefan Ciobâcă

Date of Approval in the Department

Head of Department

Prof. Dr. Dorel Lucanu