



## 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 Ciobăcă						
2.3 Tutorial Class Instructor	Dr. Rodica Condurache						
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	<b>Ability to correctly understand a text, ability to express oneself, basic knowledge of mathematics</b>

**5. Conditions** (if any)

5.1 Course Operation	The students must be respectful, quiet (with their mics off unless actively participating) and pay attention. The lecture is online on the Webex platform. Discussions will be held on the Discord channel.
5.2 Tutorial/Laboratory Class Operation	The students must be respectful, quiet (with their mics off unless actively participating) and pay attention. The seminar is online on the Webex platform. 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	<b>C1.</b> Understands the concepts related to logic in computer science: syntax, semantics, normal forms, deductive systems, resolution. <b>C2.</b> 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.	Organisation	Discussions.	2
2.	Introduction. Informal Propositional Logic. The Syntax of Propositional Logic.	Lecture	2
3.	The Semantics of Propositional Logic	Lecture	2
4.	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 Arusoaiie, Rodica Condurache, Cristian Masalagiu. Logic for Computer-Science – Lecture Notes. Available online at <https://profs.info.uaic.ro/~logica/>. To print in color.

### Supplementary references:

*Open Logic Project*

*Logica Propozițională:*

<http://builds.openlogicproject.org/content/propositional-logic/propositional-logic.pdf>

*Logica de Ordinul I:*

<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](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. Preliminary test.	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
<b>Bibliography</b> <i>No extra bibliography.</i>			

### 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 <i>take home exam (depending on the existing restrictions, resources and the epidemiological status)</i> 50% - examination period: written test or <i>take home exam (depending on the existing restrictions, resources and the epidemiological status)</i>	100%



		The final grade is computed according to the statistical distribution of the obtained points.	
<b>10.5</b> Tutorial/ Laboratory Class	Quality of the proposed solutions.	Assessment of classroom activity; Top answers; Active participation.	<b>Bonus</b> (at most 20%)
<b>10.6</b> 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

24.09.2021

Lecturer

Conf. Dr. Ștefan Ciobâcă

Tutorial/Laboratory Instructor

Lect. Dr. Rodica Condurache

Date of Approval in the Department

Head of Department

Prof. Dr. Dorel Lucanu