Mathematical Logics
Course Description

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Course Objectives

Goal

The goal of this course is to provide motivations, definitions, theorems and techinques in support of the usefulness of logic in the effective and efficient modeling of data and knowledge and reasoning about them. The course will have succeeded if it provides to the students the basic techniquest in logics and stimulates their interest to continue their career with higher interest into logic-based models for data and knowledge representation in their own field of expertise, and to produce computer-processable solutions of relevant problems.

PENGUINS ARE BLACK AND WHITE.
SOME OLD TV SHOWS ARE BLACK AND WHITE.
THEREFORE, SOME PENGUINS ARE OLD TV SHOWS.

GLASBERGEN

Logic: another thing that penguins aren't very good at.

Method

Theory	Introduction to the most important notions in propositional, first-order and modal logics, including definitions, theorems and their proofs.
Tools	Introduction to the basic tools for automated reasoning in propositional logic, first order logic, and modal logics
Theoretical exercises	The students are asked to apply the basic results (definition + theorems) and to prove some basic properties of various logics (yes!!! you have to know how to prove a simple theorem)
Practical exercises	Proper usage of the tools for representing knowledge with logic and apply automatic reasoning techniques.

Course syllabus

INTRODUCTION		
2/21/2013	Introduction to Logic	Luciano
2/22/2013	Introduction to Algebra	Enzo
PROPOSITIONAL LOGIC		
2/28/2013	NO LECTURE	
2/21/2013	Syntax and semantics of PL	Chiara
3/5/2013	Axiomatization and reasoning	Chiara
3/7/2013	Exercises on basic logic	Enzo
3/12/2013	Soundness and completeness proof	Chiara
3/14/2013	SAT and DPLL (minisat)	Luciano
3/19/2013	Esercitazione su Sat	Enzo
3/26/2013	Assessment on Propositional logic	
FIRST ORDER LOGIC		
3/21/2013	Syntax and semantics of FOL	Chiara
4/4/2013	Axiomatization and reasoning	Chiara
4/9/2013	Exercises on basic first order logic	Enzo
4/11/2013	Soundness and completeness proof for FOL	Chiara
4/16/2013	Basic model theory	Luciano
4/18/2013	Resolution and unification	Luciano
4/23/2013	Esercitazioni su Resolution and unification	Enzo
4/30/2013	Assessment on First Order logic	

Course syllabus (cont'd)

MODAL LOGIC		
5/2/2013	Syntax and semantics of Modal Logic	Luciano
5/7/2013	K, T, B, S4 . . . . Normal modal logics	Luciano
5/9/2013	Exercises on basic modal logics	Enzo
5/14/2013	Reasoning in modal K (tableaux)	Luciano
5/16/2013	Basic model theory (bisimulation)	Luciano
5/21/2013	Uses of modal logics (temporal, epistemic, . . .)	Chiara
5/23/2013	Exercises on modal logics	Enzo
6/4/2013	Assessment on Modal Logics	

Due to exceptional situations, the Dates of classes could be modified

Course web site

http://disi.unitn.it/~ldkr/ml2013/index.html

Ricevimento studenti

Get an appointment via e-mail:

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Assessments algorithm

- Assessments and exams are exclusively written, no oral exams are possible;
- At each assessment you can score from 0 to 33;
- an assessment is passed if you score more or equal to 18;
- the final exam is composed of three parts: one for PL one for FOL and one for ML. In each part you can score from 0 to 11;
- To pass the final exam you have to score more or equal to 6 in each of the parts;
- the final mark of the exam is the sum of the marks of the single parts;
- A final mark > 30 corresponds to 30 com lauda. For non integers marks we will apply "round to nearest" (see http://en.wikipedia.org/wiki/Rounding)

- If you **pass all the mid term assessments** then you will get a score equal to the average of the scores of the assessments
- If you pass **pass at least two mid term assessments**, then you can make the written exam only on the part corresponding to the failed assessment. If you pass the part you mark will be the average between the marks of two passed mid term assessments and $3 * m$ where m is the mark of the part of the exam corresponding to the failed mid term assessment;
- **otherwise** you have to take the full final written exam. To pass the exam you have to pass all the three parts. The mark is obtained as the sum of the marks of the three parts.

Assessments algorithm - Example

1. A passes the three mid terms assessments with the marks: 30, 29, 33. A's final mark is $92/3 = 30$ cum lauda
2. B passes the three mid terms assessments with the marks: 18, 20, 21. B's final mark is $59/3 = 20$
3. C passess only the first and second assessment with mark 23 and 26. C passes the ML part of the final exam with mark 7. C's final mark is $(49 + 7*3)/3 = 23$
4. D does not pass two mid term assessments and does the final exam with the marks, 10, 11 and 6. C's final mark is 27.