CARLETON UNIVERSITY
SCHOOL OF COMPUTER SCIENCE

COMP 3400A: Computational Logic and Automated Reasoning

Winter Term 2017

Instructor: Prof. Leopoldo Bertossi
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Course Web Page: `http://www.scs.carleton.ca/~bertossi/complog/index.html`
All announcements are made through the News section of this page. Check it frequently.

Lectures: T & Th 14:30-16:00. Room: Patrick's Building 435.

Office hour: Room Herzberg 5125A. Th. 11:30-13:00.

Prerequisites: COMP 1805 or any standard discrete math course.

TA: Zahra Hassanzadeh (zahrahassanzadeh@cmail.carleton.ca)

TA Office Hour: TBA.

Assessment: 5-6 assignments related to the use of automated reasoning systems: 45%. One midterm test taken in class (30%), and a take-home exam (25%). To pass the course the average of the last two marks (in percentage) must be at least 35%.

Assignments have to be prepared with Latex, the *de facto* standard for scientific and technical document writing, and submitted both in PDF format and in printed form (through a box in room HP 3115).

Description:

This course is about using different kinds of applications of symbolic logic, in particular classical predicate logic, to: (a) represent knowledge, (b) declaratively model computational/algorithmic problems, and (c) solve them by means of automated reasoning.

Special emphasis is placed on logical descriptions of possibly hard combinatorial and computational problems. Some automated reasoning systems will be used to model problems and compute solutions from their logical representations, among them: Otter/Prover9/Mace, Prolog, Datalog, DLV.

Topics include: Introduction to classical logic and reasoning. Classical reasoning systems and their use. Elements of knowledge representation and commonsense reasoning. Logical description of combinatorial problems. Elements of logic programming and Datalog. Introduction to *answer set programming* and its applications.

The course emphasizes concepts, techniques, and applications rather system issues. Imperative programming of the usual kind is not considered for this course.

This course combines well with courses on artificial intelligence, knowledge representation, data management, algorithms, declarative programming, and formal methods in software engineering, but none of them is a prerequisite.

Reading Material (mandatory):

1. Lecture notes posted after every lecture on the course web page.

   It is strongly recommended to read the slides after every lecture before attending the next lecture.

2. Relevant survey and research papers will be posted on the course web page for mandatory reading.

Additional Reading Material (supplementary):

1. Michael Genesereth and Eric Kao. "Introduction to Logic". Second Edition, Synthesis Lectures on Computer Science #6, Morgan & Claypool Publishers, 2013. (E-edition accessible through CU Library)

2. M. Gelfond and Y. Kahl. "Knowledge Representation, Reasoning, and the Design of Intelligent Agents". Cambridge Univ. Press, 2014. (E-edition accessible through CU Library)