CARLETON UNIVERSITY
SCHOOL OF COMPUTER SCIENCE

COMP 3400A: Computational Logic and Automated Reasoning

Winter Term 2018

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 11:30-13:00. Room: SA 516.

Office hour: Room Herzberg 5125A. Tu. 14:00-15:30.

Prerequisites: COMP 1805 or any standard discrete math course.
Recommended: COMP 2804.

TAs: Zahra Hassanzadeh (zahrahassanzadeh@cmail.carleton.ca) &
Jordan Li (JordanLi@cmail.carleton.ca)

TA Office Hours: TBA.

Assessment: 4-5 assignments related to the use of automated reasoning systems: 40%. One midterm test taken on March 1st in class (30%); and a Final Exam (30%) during the official final examination period and scheduled by CU. To pass the course the average of the last two marks must be at least 40 (%).

Assignments must be prepared with Latex, the *de facto* standard for scientific and technical document writing, and submitted both in PDF format.

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 **immediately 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; and, unless otherwise stated, comprehension of their contents may be tested throughout the evaluation process.

Additional Reading Material (supplementary):

1. Michael Genesereth and Eric Kao. "Introduction to Logic". Third Edition, Synthesis Lectures on Computer Science #6, Morgan & Claypool Publishers, 2017. (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)

How to succed in this course:

1. Read daily the course web page, for news and material. This will be the only general communication channel.

2. Actively attend every lecture, pay attention, and participate in class. Questions and discussions are welcome.

3. Do not use mobile phones or computers in class. You will not need them.

4. Read the slides posted after every lecture before attending the next.

5. Redo yourself and in detail all the examples shown in class, and solve all the proposed exercises in the slides.

6. Do yourself all the assignments; and if you work in a group, make sure you understand all the details of the solution.

7. Revise marked assignments and tests to detect what you may have done wrong.

8. Take advantage of office hours.