Logic and Database Theory (COMP0009)

Description

Aims:
The module aims to introduce and familiarise students with logical and mathematical inference and with database theory, the latter having an emphasis on the fundamentals of relational database systems and SQL. Students learn a number of logical inference methods for classical logics.

Learning outcomes:
On successful completion of the module, a student will be able to:
1. understand how axiomatic systems can be used for propositional and predicate logic;
2. understand the notions of soundness and completeness;
3. understand how propositional and predicate tableaus work;
4. have familiarity with other logics, including modal and temporal logics;
5. be able to analyse relational databases.

Content:
Propositional logic, Predicate logic, Modal Logic and Temporal Logic:
- Review of syntax and semantics.
- Deduction and Inference.
- Truth tables.
- Decidability of propositional logic.

Mathematical proofs:
- Proof by contradiction.
- Induction and structured induction.
- Hilbert systems.
- Axioms and inference rules for propositional logic.
- Axioms and inference rules for predicate logic.
- Axioms and inference rules for modal and temporal logics.
- Tableau construction for propositional logic, predicate logic, modal logics.
- Soundness and completeness theorems for first order logic.
- Semi-decidability of first order logic.

Key information

Year 2019/20
Credit value 15 (150 study hours)
Delivery UG L5, Campus-based
Reading List View on UCL website
Tutor Prof Robin Hirsch
Term Term 1
Timetable View on UCL website

Assessment

For more information about the department, programmes, relevant open days and to browse other modules, visit ucl.ac.uk
Finite computation methods:

Databases:
- Database management systems (DBMS) and the relational database; essential concepts; data model; and architecture and primary functions of the DBMS.
- SQL; use of SQL as a language for database construction and data manipulation.
- Database design; a structured method for designing relational databases through data modelling, schema specification, validation, and normalisation.

Requisites:
In order to be eligible to select this module, a student must be registered on a programme for which it is a formally-approved option or elective choice AND must have:
- taken in Term 1 Theory of Computation (COMP0003) and Algorithms (COMP0005);
- some programming experience (as the assessment will require them to implement a program in C).