FINO PhD Program in Philosophy
Epistemological Curriculum
A.Y. 2020-2021

The course is eligible by second-year students of the Epistemological curriculum as a way of earning (part of) their free 10 credits.

Title: *Advanced topics in Logic*

Course Description
The course aims to introduce some algebraic tools used in the study of logic. The first part will be dedicated to lattices and Boolean algebras. In particular, the connection between partially ordered sets and lattices, distributive lattices and the lattice of equivalence relations. We will then study Boolean algebras: subalgebras, homomorphisms, congruences and quotients (the first isomorphism theorem), the decomposition theorem for finite Boolean algebras, atoms and atomic algebras, filters, ideals, prime ideals, the ultrafilter theorem and Stone representation theorem. We will also prove Arrow's theorem as a consequence of the ultrafilter theorem.
In the last part, we will explore the connection between classical propositional logic and Boolean algebras (algebraic completeness and algebrization). Finally, we will introduce the generalization of algebraic completeness (the Lindenmbaum-Tarski process) and the research program of Abstract Algebraic Logic.

Course organization
20 hours of lectures (2 hours per lecture).

Teacher
Stefano Bonzio (University of Turin).

Duration and credits
20 hours.
10 credits.

Schedule

Wednesday 13 January (15-17);
Wednesday 20 January (15-17);
Wednesday 27 January (15-17);
Wednesday 3 February (15-17);
Wednesday 10 February (15-17);
Wednesday 17 February (15-17);
Wednesday 24 February (15-17);
Wednesday 3 March (15-17);
Wednesday 10 March (15-17);
Wednesday 17 March (15-17).

All classes will be given <u>on-line</u> (platform CiscoWebex). The possibility of re-scheduling in presence will be evaluated taking in consideration the evolution of the pandemic.

Please, write an email to stefano.bonzio@unito.it to receive links to meetings.

Requirements
Good knowledge of classical propositional logic

Details
The topics of the lectures will be based on:
- Burris, Sankappanavar. A course in Universal Algebra (PDF version freely downloadable).
- Dwinger. Introduction to Boolean algebras.
- Givant, Halmos. Introduction to Boolean algebras.
- Font, Jansana, Pigozzi. A Survey of Abstract Algebraic Logic, *Studia Logica* 74, 2003.