

Dean Rosenzweig

## Higher Order Logic

30 hours

Syntax and semantics of higher order logic. Expressivity of first and higher order logic: how to formalize finiteness. Finite models. Between first and second order: monadic logic, fixpoint logics, predicative logics. Henkin semantics and completeness. Proof theory of higher order logic. Higher order logic in mathematics: how to formalize Peano and Dedekind. Higher order logic in computer science: finite models and complexity, type systems, proofs-as-programs and computational theorem proving.

The course is somewhat advanced and assumes the contents of the course Applied Logic.

### Necessary text

Shapiro, S., Foundations without foundationalism, Clarendon Press, Oxford 2000.

### Recommended reading

Leivant, D., Higher Order Logic, Handbook of Logic, Artificial Intelligence and Logic Programming, D. M. Gabbay, C. J. Hogger, and J. A. Robinson, editors, Volume 2, p. 229-321., Clarendon Press, Oxford 1994.

<http://citeseer.nj.nec.com/leivant94higher.html>