

MSc in Informatics: Cognitive Science and Natural Language

LCTG—Linguistic and Computational Theories of Grammar

Autumn 2007

Prospectus

The course is an introduction to the contribution of linguistic theories of syntax to the theory and practice of computational linguistics and cognitive science, and the contribution of computer science to the theory and practice of grammar. The course concentrates on the problem of explaining universal constraints on human grammars, and the integration of syntax, semantics, and processing. It conveys the characteristics of natural grammars, the theoretical devices that have been proposed to handle them, and the implications for computational theories of language processing, including the relation of grammars to statistical models, and the role of the latter in constraining search space for parsing using linguistically realistic grammars.

The course is complementary to courses which deal with statistical natural language processing and wide-coverage parsing, such as EMNLP and SMT, and to courses which deal with linguistic and computational semantics, such as DSDC and TNLP, to all of which linkages will be made.

Outline: The problem of natural language grammar; the hierarchy of natural families of languages and the rule systems automata and structural properties that characterise them; basic notions of information, entropy, and statistical approximation; Transformational Grammar; DCGs, ATNs and other computational formalisms; compositional semantic interpretation; low-power alternatives to transformations; monotonic and monstratal theories; unification-based grammar formalisms; lexicalized grammars; the Minimalist Program; Optimality-Theoretic syntax; Problems of scaling to large coverage; the integration of statistics in processing handbuilt and machine-induced rule-based grammars.

Prerequisites: Knowledge of (or concurrent enrollment in a course on) a high-level programming language (e.g. Lisp, Scheme, C, Pascal, Prolog, etc.), and willingness to reason with formal systems (e.g. logic, mathematics).

Instructors: Mark Steedman, 2FR 2 Buccleuch Place, 650-4631, T, 2:00-3:00, steedman@cogsci, <http://www.inf.ed.ac.uk/~steedman>; occasionally, Geoffrey K. Pullum 14 Buccleuch Place, 650 3603, gpullum@ling, <http://www.ling.ed.ac.uk/~pullum>

Assistant: tba, tba, tba

Times and Places: Tuesday and Friday, 12:10-13:00, Appleton Tower AT4.12

Readings: The readings are listed separately. They will be made available in the offprint library and wherever else needed.

There is also a Sicsus Prolog manual and a related textbook by Pereira and Shieber on the class web page

<http://www.inf.ed.ac.uk/~steadman/tl.html>

Assessment 50%: four homeworks, involving Prolog programming. Each of these will be marked out of 100.

50%: Exam