

**CMPT 379-3 SECT Principles of Compiler Design**

WHERE LECTURE TIME TBA ... EXAM TIME TBA

Instructor: A. Sarkar

**OBJECTIVE/DESCRIPTION:**

This course covers the fundamentals of compiler theory used to build compilers for high level programming languages. Algorithms used in building a compiler and their underlying theoretical foundations will be covered. We will cover each component of a compiler including lexical analysis, parsing, code generation, code optimization and type checking. Working in small teams, students will also implement a working compiler for a high level programming language.

**TOPICS:**

- Overview of a compiler
- Lexical Analysis: formal language theory: regular expressions and finite-state machines, scanners, symbol tables
- Simple Parsing: context-free grammars, derivation trees, ambiguity, sentential forms, backtracking parsers, top-down versus bottom-up parsing
- LL(1) parsing: removing left-recursion, left-factoring, error handling
- Shift-reduce parsers: handles and handle pruning, shift/reduce conflicts
- SLR/LR parsing: characteristic automata, action and goto functions, viable prefix, introduction to LALR parsing
- Type checking: typing rules, unification, types as inferencing rules, attribute grammars
- Semantics and code generation: generating code from attribute grammars, flow of control, handling memory, garbage collection, generating code for conditionals, arrays, and procedures
- Optimization: peephole optimization, redundant instruction elimination, dataflow analysis and global optimization (an introduction)

**GRADING:**

The grade distribution will be handed out at the start of classes.

**TEXTBOOKS:**

- Compilers: Principles, Techniques and Tools, A.V. Aho, R. Sethi, and J.D. Ullman, Addison-Wesley, 1986

**PREREQUISITES/COREQUISITES:**

Macm 201 ( or CMPT 205), CMPT 150 and CMPT 201

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