

**CISC 471/672: COMPILER CONSTRUCTION**  
**Fall 2015 Midterm Exam Study Guide**  
**In-class individual exam**

**References**

- Class-time notes and slides from start of course through October 8, 2015.
- Readings listed on schedule through October 8, 2014.
- Projects (PA0, PA1, and PA2) with JLex and JavaCup), MeggyJava and AVR.
- Handouts from class - see the course calendar
- Quizzes

**Topic Coverage**

- overall compiler and compiler-related tool constructions.
- lexical specification: regular expressions - reading and writing.
- implementation of a lexical analyzer: manually and using JLex.
- dfa and nfa construction from regular expressions.
- error detection and recovery in lexical analysis.
- syntax specification: context free grammars.
- problems with grammars: ambiguity.
- grammar rewriting to attempt to remove ambiguity.
- top-down parsing: getting the grammar in the right form (left factoring, eliminating left recursion, recursive-descent parsing, FIRST and FOLLOW computation, LL(1) parsing method and parse table construction, determining whether a grammar is LL(1).
- use of JavaCup.
- ASTs, AST building.
- AVR assembly and MeggyJava programming.
- Type systems - how to read and write formal type rules.
- Type checking and inference.

**Format of Exam**

The exam is closed book, closed neighbor and you will have the full class period to work. In general, the exam will be a combination of testing your basic knowledge and understanding of the concepts covered in class and application of the concepts. The questions will most likely be of the form:

- Short answer.
- Writing regular expressions.
- Drawing DFA's/NFA's.
- Understanding of a lex-like specification.
- Writing context-free grammars.
- Rewriting context-free grammars.
- Identifying problems in context-free grammars.
- Deriving strings and constructing parse trees.
- Top-down parsing methods (recursive-descent, LL(1)):  
(writing part of a recursive-descent parser, constructing FIRST and FOLLOW sets, constructing an LL(1) parse table from given FIRST and FOLLOW sets, determining whether a grammar is LL(1).
- Reading type rules and indicating type checking and inference that is to be performed
- Writing type rules, specifying what to check and infer for a given grammar rule given English description

The questions are NOT multiple choice. Instead, partial credit will be given when possible on any question in the exam.

**How to Study**

Review your lecture notes, handouts, labs, and parsing homeworks. Use a textbook as a resource for added understanding of the topics covered in class and on assignments.