Compilers and Interpreters — Fall 2015
CS 4352 — Professor L. Longpré

Course Syllabus

Course Description: The structure of compilers and interpreters: lexical syntax and semantic analysis, formal description of programming languages, parsing techniques, intermediate languages, optimization and code generation.

Prerequisite: CS 3350.

Textbooks:

- *Modern Compiler Implementation in Java*, Second Edition, by A. W. Appel, with J. Palsberg, Cambridge University Press, 2002.
- *The Definitive ANTLR 4 Reference*, Second Edition, paperback and/or eBook.

Exams and Grades: There will be two tests, some quizzes, assignments, a presentation and a final exam. The dates for the first two tests subject to change.

Test 1	13%	September 30
Test 2	13%	November 4
Presentation	10%	
Final Exam	30%	December 9, 10am
Assignments	30%	
Quizzes	4%	

Required knowledge:

1. have been introduced to:
   (a) Languages
      i. Basic familiarity with BNF & syntax diagrams
      ii. Understanding of imperative, object & functional models
      iii. Grammars

(b) Type Systems & Type Theory

(c) Compilers

i. Comparison of pure interpreters, compilers & translators

ii. Basic data structures used (symbol table, trees)

(d) Regular expressions

2. are able to apply:

(a) Basic computability

i. context-free grammars

(b) Automata theory

i. finite state machines

ii. regular expressions

iii. properties of context-free grammars

3. are able to apply the following in new situations:

(a) Abstract data types

i. Specific ADT structures including tables, dynamic linked lists, stacks, trees, etc.

ii. Strings, arrays and sequences.

iii. Sets

(b) Procedural abstractions including with/without state, functions vs. procedures, side-effects, exceptions, recursive programming.

(c) Language Knowledge

i. Detailed knowledge of at least one imperative language (or hybrid language significantly incorporating imperative structures)

(d) Type Systems

i. data types

ii. type checking

(e) Assembly level machine organization

i. assembly/machine language programming

(f) discrete mathematics
    i. iterations, proofs (e.g. inductive proofs)

Learning outcomes: On successful completion of the course, students will: (These outcomes depend on paradigm being taught)

1. have been introduced to:
   (a) Compiler optimizations techniques
2. be able to apply:
   (a) Parsing
       i. left-right, top-down, bottom-up algorithms
       ii. generation of parse tables including SLR(1) & LL(1)
   (b) Type systems
       i. type-checking algorithms
   (c) Stack frame allocation
   (d) Code generation
   (e) lex and yacc (or flex and bison) utilities vis-a-vis theory
3. be able to apply the following in new situations:
   (a) Lexical analysis (scanning)
   (b) Symbol table definition & manipulation including one and two pass updates.
   (c) Use of compiler creation tools like lex and yac.

Standards of Conduct: Students are expected to conduct themselves in a professional and courteous manner, as prescribed by the Standards of Conduct. Students may discuss work assignments and programming exercises in a general way with other students, but the solutions must be done independently. Similarly, groups may discuss group project assignments with other groups, but the solutions must be done by the group itself. Graded work should be unmistakably your own. You may not transcribe or copy a solution taken from another person, book, or other source, e.g., a web page.

Professors are required to – and will – report academic dishonesty and any other violation of the Standards of Conduct to the Dean of Students.

Disabilities: If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.

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Office Hours: TR 2-3pm, or make an appointment via the professor's web site. Contact the professor by e-mail if a time outside the available time slots on the professor's web site is required.

Material: Tentative schedule distributed separately.