

Comp 2140: Computer Languages, Grammars and Translators (2019 Winter)

1 Instructors

- Professor Jianguo Lu
 - Web site: <http://cs.uwindsor.ca/~jlu>
 - Email: jlu at uwindsor,
 - Office: LT5111.
 - Phone: 519 253 3000 ext 3786
- GAs
 - To be announced.

2 Class time and place

- Course web site: <http://cs.uwindsor.ca/~jlu/214>. Also on Blackboard.
- Instructor office hours: Tuesday and Thursday 12:00-1:00.
- GA office hours: TBA
- Midterm exam: Feb 12.
- Assignments due dates: There are five assignments. Their tentative due dates are on Lab 2, Lab 5, Lab 7, Lab 9 and Lab 10. The due dates can be adjusted to synchronize with the progress of lecture components.

3 Course Overview

This course covers both pragmatic and theoretical aspects of grammars, recognizers, and translators for computer languages. The theoretical aspect contains regular language, context free language, finite state machine, different parsing techniques including recursive descent parsing, LL(1), SLR, LALR, and LR(1) parsing. The practical aspect contains automatic generation of

scanners using a scanner generator JLex, automatic parser generation using parser generator JavaCUP, and language translation techniques. All the assignments will use Java, hence you should have a solid knowledge in Java programming. After this course, you will be able to understand grammars, write grammars, write parsers according to a grammar, and write a translator between different languages. Attendance in lectures and labs is very important to be successful in this course - students who do not attend lectures and labs generally score very low on exams and assignments. You must keep up with the material as the semester progresses.

4 Marking Scheme

There is one midterm exam, one final exam, and four assignments. The weights of assignments, lab attendance, and exams are listed in the following table:

Exams	72 %	Midterm	24%
		Final	48%
Assignments	28%	assignment 1: regular expression	5%
		assignment 2: scanner generation using Jlex	6%
		assignment 3: parser generation using JLex and Javacup	6%
		assignment 4: program translation	6%
		assignment 5: recursive descent parsing	5%
Total	100%		100%

Please make sure that you can attend the exams. The only valid excuse for missing an exam is a documented medical emergency. The "Student medical certificate" is the only acceptable medical document and must be signed by a certified medical doctor. A missed exam without medical documentation will result in a mark of zero.

5 Lecture Schedule

The tentative lecture schedule is as follows:

Week 1 Course overview; Overview of compiler and grammar

Week 2 Lexical analysis: regular expression, its formal definition using set theory, and its correspondences to regular grammar. The translation between regular grammar and regular expression.

Week 3 Finite Automata(FA), the translation from regular expression to finite automata. Use automata to accept or reject strings. Lexical generator JLex.

Week 4 Context Free Grammar (CFG), Backus Naur Form (BNF). Chomsky hierarchy. Derivation, left-most derivation, right-most derivation, Parse tree.

Week 5 Ambiguous grammar, removal of ambiguity. Midterm exam.

Week 6 Bottom up parsing: Shift-reduce parsing, configuration, states, transition between states, LR(0) table. SLR parsing.

Week 7 Bottom up parsing, LR(1) parsing, LALR.

Week 8 Parser generator: Use JavaCup to generate parser from a context free grammar.

Week 9 Practical consideration of parsing.

Week 10 Top-down parsing method: left recursion and its removal, left factoring of a grammar. Predictive parsing, LL(1) parsing method.

Week 11 Top down parsing method: recursive descent parsing.

Week 12 Attribute grammar, Type checking.

6 Labs

Supervised labs aim at putting into practice techniques and concepts seen during the lectures. Most of the labs will be used to help with your assignments. Specifications of lab tasks will be posted in advance on our course web site at <http://cs.uwindsor.ca/~jlu/214>.

7 Teaching Evaluation

Student Evaluation of Teaching (SET) forms will be administered during the last two weeks of the class schedule.

8 Academic dishonesty

Plagiarism is not tolerated. We will run programs that can check the similarity between assignment submissions. Anyone found cheating on assignments or examination will be reported to the dean. Programming assignments must be strictly individual efforts. Discussion with other students must be limited to general discussion of the problem, and must never involve examining another student's source code or revealing your source code to another student.

9 Important note

Please note that no student is allowed to take a course more than two times without permission from the Dean.