CPS 565 Compiler Design
Fall, 2022

Delivery

Face to Face, lecture on TF, 8-915 am

Prerequisites

Graduate standing, knowledge of Java

Credit hours

3

Course description

The theory and practice of language processing: finite state machines, context-free grammars, push-down machines, lexical analysis, top-down and bottom up parsing, and parser generators.

Student Learning Outcomes

Students should be able to:
Define languages with regular expressions
Define languages with context-free grammars
Convert linear grammars to regular grammars
Write grammars for lists
Determine leftmost and rightmost derivations of a given string
Construct a parse tree for a given string
Modify grammars using substitution
Identify ambiguous grammars
Convert an ambiguous grammar to a nonambiguous grammar

Determine nullable nonterminals

Eliminate lambda productions and lambda productions

Eliminate useless productions

Modify recursive grammars

Add the null string to a language by modifying the grammar

Write a variety of grammars for arithmetic expressions

Know how to specify associativity and precedence in a grammar

Understand BNF

Understand syntax diagrams

Understand noncontracting grammars

Convert a CFG to an essentially noncontracting grammar

Prove languages are not context free using the pumping lemma

Write context-sensitive grammars

Write unrestricted grammars

Write programs for Turing machines

Understand Chomsky's hierarchy

Construct a stack parser

Determine selection sets for context-free grammars

Know how to parse with an ambiguous grammar

Construct recursive-descent parsers

Construct recursive-descent translators

Write assembly language programs using the stack and register instruction sets

Write a compiler for a C type of language

Construct finite automata

Convert between finite automata, regular expressions, and regular grammars

Construct a grep program using compiler technology

Implement a variety of optimization techniques

Construct a pure interpreter

Construct a compiler-interpreter

Understand bottom-up parsing

Topics

Strings, languages, compilers

Context-free grammars

Chomsky's hierarchy

Top-down parsing

LL(1) grammars
Recursive descent parsing
Recursive descent translation
Assembly language
Implement a C type compiler
Finite Automata
Implementing grep
Register-oriented architecture
Optimization
Interpreters
Bottom-up parsing

Textbook and Course Materials

Optional Textbook: *Compiler Construction Using Java, JavaCC, and Yacc*, by Anthony J. Dos Reis, Wiley/IEEE, 2012, first edition, available at amazon.com. Software for the textbook, slides, and lab assignments are available on the brightspace site for the course in the Content section.

Help on WebEx, Zoom, and Skype

Help on WebEx, Zoom, and Skype:
https://sites.newpaltz.edu/news/2020/04/resources-to-support-students-during-the-transition-to-remote-learning/

Help on Skype:
https://support.skype.com/en/faq/FA11098/how-do-i-get-started-with-skype

Privacy: WebEx, Zoom, and Skype

https://callinghelp.webex.com/privacy/
https://zoom.us/privacy/
https://support.skype.com/en/skype/all/privacy-security/

Student Collaboration

Students are welcome to form study groups. But keep in mind that work you turn in for grading should be your own **individual** work. Common tools for group meetings are WebEx, Zoom, or Skype.

Media player for Windows

https://www.videolan.org/vlc/

Course Policies

Homework you hand in should be your own individual work. No late homework will be accepted. Save all your graded work in case you have an issue with your final grade. Save this syllabus. You may need it later—for example, to transfer credit to another college. Homework will generally be graded during the weekend following its submission. Grades will be posted that weekend. `Under no circumstances should you copy any code from someone else—not even a single statement—or provide your code to someone.`

Campus-wide Policy Statements

1. Academic integrity policy statement: *Students are expected to maintain the highest standards of honesty in their college work. Cheating, forgery, and plagiarism are serious violations of academic integrity. Students found guilty of any violation of academic integrity are subject to disciplinary action, up to and including expulsion. New Paltz's undergraduate* and *graduate academic integrity policies are published in the respective catalogs. Sojourner Truth Library's website contains several excellent resources to help with avoiding plagiarism.*
2. Reasonable accommodation of individuals with disabilities statement: *Students needing classroom and/or testing accommodations related to a disability should contact the Disability Resource Center (Haggerty Administration Building, Room 205, 845-257-3020) as close as possible to the beginning of the semester. The DRC will then provide students' instructors with Accommodation Notifications verifying the need for accommodations. Specific questions about services and accommodations may be directed to Deanna Knapp, Assistant Director (knappd@newpaltz.edu) or Jean Vizvary, Director (vizvaryj@newpaltz.edu).*
3. Veteran & Military Services statement: *New Paltz's Office of Veteran & Military Services (OVMS) is committed to serving the needs of veterans, service members and their dependents*

during their transition from military life to student life. Student veterans, service members or their dependents who need assistance while attending SUNY New Paltz may refer to OVMS's website; call 845-257-3120, -3124 or -3074; e-mail np-vms@newpaltz.edu; or stop by the Student Union, Room 100 South.

4. Computer and network policies statement: *Users of New Paltz's computer resources and network facilities are required to comply with the Acceptable Uses and Privacy Policy and other institutional policies related to computer and internet access and usage.*

5. Identity verification policy statement for online courses: New Paltz's *Online Identity Verification Policy* is designed to verify that students enrolled in our online courses and/or programs are the ones who take the courses, complete the programs, and receive the academic credit.

6. Title IX and related policy statement: *Gender discrimination, sexual harassment, sexual assault, sexual violence, stalking, and power-imbalanced sexual/romantic relationships between faculty and students are strictly prohibited within the SUNY New Paltz community. We encourage students to report, confidentially discuss, or raise questions and concerns regarding potential violations. Reports can be made to the Title IX Office, the department chair and/or the dean of your school. The Office of Human Resources, Diversity & Inclusion (HRDI) can provide more information on Title IX reporting and support as well as the College's Consensual Relationships Policy.*

7. Grievance Policy
//www.newpaltz.edu/media/compliance-and-campus-climate/SUNY%20New%20Paltz-SCI-Model-Title-IX-Policy_July-2020.pdf

Student Evaluation of Instruction

You are responsible for completing the Student Evaluation of Instruction (SEI) for this course and for all your courses with an enrollment of five (5) or more students. I value your feedback and use it to improve my teaching and planning. Please complete the form during the open period on-line at the end of the semester.

Instructor

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Office Hours	MTHF 930-1030 am

Computer Science Department: www.cs.newpaltz.edu   Phone：845-257-3990

Grades

Grading rubric (out of 10 points):
    Completely correct with acceptable presentation (i.e., correct formatting of code, efficient code): 10
    Completely correct with unacceptable presentation: 9
    Mostly correct: 7
    Substantially incorrect: 5
    Minimal attempt: 3

Computation of final grade:

Homework	20%	Homework and projects weighted according to difficulty and size
Midterm	40%	Friday, Oct 14, regular class time, room to be decided
Final Exam	40%	12/20 8-10 am

Withdrawal deadline

Nov. 6