CPS 425 Language Processing
Fall, 2022

Delivery

Face to face on campus

Covid

Please follow all the College's rules and recommendations on covid.

Prerequisites

Course in assembly language

Credit hours

4

Course description

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

Student Learning Outcomes

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

Determine nullable nonterminals
Eliminate lambda productions and lambda 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 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 basic principles of complexity and computability
Understand Chomsky's hierarchy
Determine predicts sets for context-free grammars
Know how to parse with an ambiguous grammar
Construct recursive-descent parsers
Construct recursive-descent translators
Write a compiler for a C type of language
Construct finite automata
Convert between finite automata, regular expressions, and regular grammars
Implement a variety of optimization techniques
Construct a pure interpreter
Construct a compiler-interpreter

Topics

Strings, languages, compilers
Context-free grammars
Chomsky's hierarchy
Parsing
LL(1) grammars
Recursive descent parsing
Recursive descent translation
Implement a C type compiler
Finite Automata
Optimization
Interpreters

Turing machines
Bottom-up parsing
Compiler-compilers

Textbook and Course Materials

Required textbook: *Writing Interpreters and Compilers for the Raspberry Pi Using Python Second Edition*, by Anthony J. Dos Reis, available from amazon.com at $19.90. **Be sure to get the SECOND EDITION**.

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. **Under no circumstances should you copy any code from someone else—not even a single statement—or provide your code to someone.**

Course Policies

Attendance in lab is required.

Submit lab assignments to your lab instructor.

Homework you hand in should be your own individual work. No late homework assignments 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.

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

Professor A. J. Dos Reis

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Office Hours	MTHF 930 am-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
- Late: 0
- Cheating on exam: F grade in course
- Submitting work not done independently or providing your work to someone else: at least negative the max value for assignment

Computation of final grade:

Projects	20%	Projects weighted according to difficulty and size
Lab	20%	Lab assignments equally weighted
Midterm	25%	Thursday, 10/13/2022 regular class time
Final Exam	35%	Friday, 12/15/2022 , 1015 am- 1215pm

Withdrawal deadline

Thursday, Nov 6