Syllabus for LIN 637

Computational Linguistics 2 – Spring 2023

MW 08:30-9:50

Last Updated: January 23, 2023

Course Website: https://github.com/Compling2-Spring2023-SBU/main

(clickable)

1 Course Outline

1.1 Description

This course is an introduction to the theoretical foundation of computational linguistics. The course emphasizes the importance of algorithms, recursive data structures, formal language theory, finite-state machines and logic for understanding natural languages, as well as the development of new tools and software applications. Empirical phenomena in phonology and syntax are sampled from a variety of languages to motivate and illustrate the concepts. Students will develop familiarity with the literature and tools of the field.

The course also serves as a bridge from introductory courses in linguistics (Syntax 1, Phonology 1, Phonetics) and computational methods (Statistics, Mathematical Methods in Linguistics, Computational Linguistics 1) to advanced courses and seminars in computational/mathematical linguistics. In contrast to the NLP courses offered by the department of computer science, this course focuses on studying the properties of natural language from a computationally informed perspective. The question is less about how to use computers for language-related tasks, but more about how language can be conceptualized as a computational problem.

1.2 List of topics

- *Formal Grammars and Languages*
  - The how what and why of formalization
  - Recursive structures
- *Strings for phonology and morphology*
  - String languages
  - String transductions
  - Regular, Rational, and Subregular classes

  - Finite-state, algebraic and logical perspectives thereof

- *Trees for syntax and morphology*
  - Tree languages
  - Rational tree languages
  - Tree transductions
  - Subregular tree languages and transductions
  - Finite-state and logical perspectives thereof

- *Haskell*
  - Functional programming
  - Fully typed
  - Lazy evaluation
  - Think different!

1.3 Prerequisites

The only official prerequisite is Computational Linguistics 1 (Lin 537) or prior programming experience.

2 Graded Component

- **Homework**
  - Approximately 10-12 exercises, mostly programming assignments.
  - Homework submission and grading is done via github.
  - Collaboration on homework problems is encouraged as long as the solution you turn in is completed by yourself, using your own words, examples, notation, and code.
  - 2/3 of final grade

- **Project**
  - You will conduct a project in this class and turn it in
  - Projects include theoretical research, program/software/tool development, a software-aided study of language data, or anything else I approve.
  - I want to encourage people to begin to work on this as soon as possible.

    Your project proposal must be approved by me before I will accept your final paper. The proposal should: be 1-2 pages (300-500 words) in length, have a title, include references, provide background on the problem to be addressed (what it is and why it is important), provide an explanation or plan of how you approach the problem, provide an explanation of how you will measure success.

    Students are required to have a 1-1 meeting with me before February 24 to discuss potential final projects. Proposals can be submitted to me anytime after that meeting. I may return it with feedback for additional revision before approving it. The proposal should be approved by me no later than March 24.

  - The project itself is due on Friday May 5.
  - 1/3 of final grade

- **Readings**

  - Readings will be given regularly and made available on the course website or by email.
  - It is presupposed in the lectures that you have done the required readings.

- **Workload per Credits**

  - *0 credits*: attend (but I highly recommend that you at least read the assigned papers as they will be important for following the lectures)
  - *1 credit*: attend, participate, readings,
  - *2 credits*: attend, participate, readings, homework
  - *3 credits*: attend, participate, readings, homework, project

University Policies and Services

Student Accessibility Support Center Statement If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website: `https://ehs.stonybrook.edu//programs/fire-safety/emergency-evacuation/evacuation-guide-disabilities` and search Fire Safety and Evacuation and Disabilities.

Academic Integrity Statement Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Professions, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at `http://www.stonybrook.edu/commcms/academic_integrity/index.html`

Critical Incident Management Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Student Conduct and Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters

can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.