

Syllabus – LIN 626
Spring 2020
Computational Phonology
(Revised March 23, 2020)

Instructor	Course	Office Hours
Jeff Heinz jeffrey.heinz@stonybrook.edu N237-SBS/L160-IACS	LIN 626 Computational Phonology SBS S216 (dept library)	MW 15:00-16:14:30-16:00 and by appointment

Course Location: Online with Google Meet

Office: <https://whereby.com/the-heinz-virtual-office>

Note that whereby.com requires no additional software. It's only requirements are a computer, laptop, or phone equipped with a typical browser, microphone and/or camera, and audio output.

Course Website: <http://jeffreyheinz.net/classes/20S/>

Prior to each class, students will be notified by email at their stonybrook.edu email addresses the meeting ID for Google Meet.

If you cannot reach your instructor, please email [CAS Dean@stonybrook.edu](mailto:CASDean@stonybrook.edu)

Course description This seminar is about computational phonology. We will do the following:

- Study extensional versus intensional descriptions of phonology.
- Make computational analyses of traditional phonological data sets.
- Advance phonology with new empirical studies.
- Advance theory with computational analysis.

Most classes will be conducted in the style of a workshop where we collectively work on problems. In the first part of the class, I will lead the study of the extensional versus intensional descriptions of phonology and explain how to write grammars with formal logic. In the second and third parts of the class, we will work on various problems and read papers directly relating to the short and long papers you must write.

Grades are determined as follows.

A.	class attendance and participation	10%
B.	5 short assignments (single-authored)	20%
C.	1 short paper (single-authored)	20%
D.	<u>Lead 1 class presentation Discussion</u>	10%
E.	long paper (may be co-authored)	40%

Students taking the course for 1 credit must complete items A and B. Students taking the course for 2 credits must complete items A, B, C and D. Students taking the course for 3 credits must complete items A, B, C, D and E.

A. Participation ~~Attendance is required. Reasonable participation is expected (If everyone spoke at length every class, we wouldn't get through a lesson).~~

~~It is unacceptable to stay silent every class and to only speak up if directly addressed. Everyone has something to contribute. Part of your job is to contribute and part of your training is step outside your comfort zone and try. Make an effort.~~ After Spring Break, instruction will take place at the normal class hours, using the Google Meet conferencing software, which facilitates lectures, presentations, and real-time, synchronous discussion. Attendance and participation is encouraged as much as possible.

All classes will be recorded and a link to the video will be made available at the course website so it can be watched by students once it has been posted.

Additionally students can communicate with each other and the course instructor about course topics on the discussion board set up on March 11, 2020 on Slack:

<https://lin626spring2-7dd9216.slack.com/>.

B. Short Assignments These are short HW exercises that give you practice with the main ideas in the course. They are always due the next class. We will go over the answers in class and I will collect them to check for completion.

Short Assignments are only given prior to Spring Break. No short assignments will be given after Spring Break.

C. Short paper This paper is like the assignments you did in Phonology 1 and 2, where a data set is examined and a phonological analysis is presented. The difference is that the analysis you will use will not be rule-based or OT-based. Instead it will be based on computational principles studied in class. This paper is due March 11, 2020.

~~**D. Presentation** You will~~

D. Lead 1 Discussion To the extent possible, students will either lead a discussion ~~in class on an~~ synchronously during normal class hours or asynchronously using the discussion board outside of normal class hours, on a research article relevant to the course and/or your research project. ~~You~~

Students who lead a discussion synchronously in class should prepare a short handout or ~~slideshow~~ slides which reviews the material in the research paper. They should present this during normal class hours online using the Google Meet software, and be prepared to answer questions about it. ~~These presentations can occur anytime after Spring Break and generally should last about~~ The slides or handout will be distributed as a PDF to the class prior to the presentation, as well as being shared using the screen sharing technology offered by Google Meet. Synchronous in class led discussions should last between 20 and 30 minutes ~~(so we can fit 2 per class if needed).~~

Students who lead a discussion asynchronously using the discussion board outside of normal class hours should prepare a handout or mini-summary which reviews the material in the research paper. They should initiate a discussion about the research article on the discussion board where they lead a Q&A about the research article and their summary. Together with the instructor, students will identify a 48 hour period where this discussion will take place.

E. Long paper ~~This paper~~ To the extent possible, students will submit a research paper which makes a theoretical contribution. With my permission, it may be co-authored with 1 or 2 or 3 other students in the class. Some possible topics are given below. Authors and topics must be approved by me by ~~April 1, 2020.~~ April 15, 2020. The paper is due on May 20, 2020 at noon and must be submitted electronically as a PDF document.

Possible Topics for the long paper This list of topics is non-exhaustive. Let's discuss!

1. Empirical Research

- Provide computational analyses of aspects of the morpho-phonology of new empirical data sets (Tati, for example).
- Some recent papers have argued against some hypothesized phonological universals on the basis of careful empirical work (Hayes and Jo, 2019; Kula and Syed, 2019). Do these analyses withstand scrutiny?

2. Logical Characterizations

- Spreading processes (cf. Chandlee and Jardine (2019b)).
- Long-distance phonological changes (cf. Heinz (2010); Burness and McMullin (2019)).
- Reduplication (cf. Dolatian and Heinz (2018))

3. Understanding insights through a computational lens

- Phonetically-based Phonology. How can insights obtained in the phonetically-based phonology program (Hayes *et al.*, 2004) be integrated with computational phonology? For instance, can the results in Jun (2004) be obtained without recourse to optimization?
- Output-driven Maps. Tesar (2014) shows how the property of out-drivenness constrains the learning space in OT. Can this idea be imported to improve the learning of ISL/OSL functions (Chandlee and Heinz, 2018)?

4. Phonological Representations

- What is the consequence of utilizing different kinds of featural systems in these computational analyses? Are there any advantages to stating privative, gradual, and equipollent oppositions directly?
- Should features be cross-classificational (as in (Hayes, 2009), or ordered into a branching tree (cf. Drescher (2009)). What's the difference?
- Syllable structure (cf. Strother-Garcia (2018, 2019))
- Autosegmental structure (cf. Jardine (2016); Koser *et al.* (2019); Chandlee and Jardine (2019a))
- Metrical structure (Yiding Hao (Yale), Nathan Koser (Rutgers))

5. Analysis comparison

- Labrune (2012) argues that the phonology of Japanese is best understood without the concept of the syllable, contra many others (see Kawahara (to appear) for an overview). Does computational analysis of these different analyses shed any light on this debate?
- More generally, examine different representational solutions to the same problem and compare them (cf. Strother-Garcia (2019)).

6. Learning

- How do we learn grammars of constraints expressed logically (cf. Strother-Garcia *et al.* (2016); Vu *et al.* (2018); Chandlee *et al.* (2019))
- How can we learn grammars of transductions expressed logically?
- How can we learn morpho-phonological grammars?

7. Programming Projects

- Write software that implements logical transductions over arbitrary relational structures.
- Write software that facilitates writing linguistic grammars logically.
- Implement and empirically evaluate various learning algorithms on corpora.

References

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- Chandlee, Jane, Remi Eyraud, Jeffrey Heinz, Adam Jardine, and Jonathan Rawski. 2019. Learning with partially ordered representations. In *Proceedings of the 16th Meeting on the Mathematics of Language*, 91–101. Toronto, Canada: Association for Computational Linguistics.
- Chandlee, Jane, and Jeffrey Heinz. 2018. Strict locality and phonological maps. *Linguistic Inquiry* 49:23–60.
- Chandlee, Jane, and Adam Jardine. 2019a. Autosegmental input-strictly local functions. *Transactions of the Association for Computational Linguistics* 7:157–168.
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- Strother-Garcia, Kristina, Jeffrey Heinz, and Hyun Jin Hwangbo. 2016. Using model theory for grammatical inference: a case study from phonology. In *Proceedings of The 13th International*

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Stony Brook University Policies

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, ~~ECC (Educational Communications Center) Building, Room 128128~~ [ECC Building](#), (631) 632-6748, ~~or at~~ sasc@stonybrook.edu. They will determine with you what accommodations, ~~if any,~~ 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-people-physical-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 Technology & Management, 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

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