

## Syllabus – LIN 626

### Spring 2020

### Computational Phonology

Instructor	Course	Office Hours
Jeff Heinz jeffrey.heinz@stonybrook.edu N237 SBS/L160 IACS	LIN 626 Computational Phonology SBS S216 (dept library)	MW 15:00-16:00 and by appointment
<b>Course website:</b> <a href="http://jeffreyheinz.net/classes/20S/">http://jeffreyheinz.net/classes/20S/</a>		

**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.	1 class presentation	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.

**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.

**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 lead a discussion in class on an article relevant to the course and/or your research project. You should prepare a short handout or slideshow which reviews the material and be prepared to answer questions about it. These presentations can occur anytime after Spring Break and generally should last about 30 minutes (so we can fit 2 per class if needed).
- E. Long paper** This paper makes a theoretical contribution. With my permission, it may be co-authored with 1 or 2 other students in the class. Some possible topics are given below. Authors and topics must be approved by me by April 1, 2020. The paper is due on May 20, 2020 at noon.

**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, and Jeffrey Heinz. 2018. Strict locality and phonological maps. *Linguistic Inquiry* 49:23–60.
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- Dresher, Elan. 2009. *The Contrastive Hierarchy in Phonology*. Cambridge University Press.
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