

## Syllabus

<b>Time</b>	T,H 11:15AM-12:30PM	<b>Instructor</b>	Kristine Yu; Kate Silverstein
<b>Place:</b>	Dickinson 206	<b>Office</b>	South College 231
		<b>Office hours:</b>	TBA
<b>E-mail:</b>	krisyu@linguist.umass.edu	<b>WWW:</b>	<a href="http://courses.umass.edu/linguist592b-kmyu/">http://courses.umass.edu/linguist592b-kmyu/</a>

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**Prerequisites** Some experience with programming (e.g. LINGUIST 409), some phonetics background (e.g. LINGUIST 414), some background in mathematics helpful

**Description/Course goals** This is an advanced undergraduate/graduate-level course introducing computation with the speech signal. Students will learn fundamentals of digital speech representation and acoustic feature extraction and be introduced to statistical learning methods for feature selection. There will be a focus on the analysis of speech phenomena involving the voice source, i.e. tone, intonation, voice quality.

**Course web page** The course web page is located at <http://courses.umass.edu/linguist592b-kmyu/>.

### Requirements

- Course attendance/participation
- Assignments
- Supplemental readings
- Term project: writeup and presentation

**Course attendance/participation** See attendance policy at end of syllabus. Students are expected to be active participants during lectures and group activities.

**Readings** Appropriate readings for students of different backgrounds will be suggested throughout the course. Some will be more elementary; some will be more advanced.

**Software** We will primarily be using the open-source, cross-platform statistical software R, available at <http://lib.stat.cmu.edu/R/CRAN/>. Please download and install it if you haven't already. If you don't already have a favored coding environment setup, consider using the RStudio IDE, available at <http://www.rstudio.com/ide/download/>.

**Assignments** There will be assignments roughly weekly. They will be assigned on Thursday and **due the following Thursday before midnight**. Turn in your assignments via e-mail to krisyu@linguist.umass.edu. Code should be well-commented and sent in a file called 592B-s14-hwX-NAME.R, where X is the assignment number, e.g. hw1 for the first homework assignment, and where NAME is your last name. Your code should be self-contained and ready for us to run.

**Projects** Each student will participate in a group research project over the course of the semester that will culminate in an individual final write-up and a group presentation. The projects on the table are: implementing methods for feature selection in classifying tones, detecting prosodic rhythm in the speech signal, building an open source software package for voice analysis, and exploring time series representations for pitch contours. We will discuss the projects and begin work on them in the 3rd or 4th week of the semester.

**Course outline** Subject to adjustment!

- Week 1: Introduction; digital representations of speech
- Weeks 2-3: The time domain – smoothing, Fourier decomposition, periodicity detection
- Weeks 4-5: The frequency domain – Fourier transforms, spectra, filters, cepstrum
  - Organization of research project groups
- Week 6: Mop-up week for feature extraction
- Weeks 7-8: Introduction to classification and dimensionality reduction
- Weeks 9-on: Introduction to methods for feature selection; advanced topics in speech signal parameterization
- Week 14: Wrap-up, final project presentations
  - Final project write-ups due 5/2/14

## Grading

- Course attendance/participation (5%)
- Assignments (60% total)
- Term project presentation (10%)
- Term project writeup (25%)

**Students with disabilities** Should you have any needs, please let me know and we will make arrangements.

**Late work/Attendance policy** Late submission of work (problem sets, final project) is allowed up to 1 week after the original due date, but 10% will be deducted for each late day. Exceptions are made in cases of extreme illness or emergencies that are communicated to the instructor in a timely manner.

See the university policy on class absence here: <http://www.umass.edu/registrar/students/policies-and-practices/class-absence-policy>.