

Syllabus: Linguistics 478/578 (also Speech and Hearing Science 478/578)

Speech Technology, Fall 2006

Time: Tuesday/Thursday 11:00-12:15

Place: Social Sciences 224 (ICL)

Professor: Natasha Warner

Office hours: T/Th 9:30-10:30, Douglass 320

Phone: 626-5591

Email: nwarner@u.arizona.edu (do not use d2l email to reach me, I don't read it)

Course webpage: d2l.arizona.edu

Course description:

The main focus of this course will be on speech synthesis (making computers talk) and speech recognition (making computers take dictation), with some time allotted to other speech and language technologies. Speech technology is an active industry, and there is great potential both for people with knowledge of speech and people with knowledge of computer science (or ideally both) to work in that industry. The purpose of this course is to give you background that would be useful if you pursue work in the speech technology industry.

Prerequisites

Either a background in phonetics (such as Linguistics 314 or 515 or Speech and Hearing 267) or strong programming skills are required for this course. (A background in both is explicitly not expected or required.) The course will be accessible for students with knowledge of speech but no programming background. It will also be useful for students with strong programming background but no knowledge of speech. There will be some readings on basic acoustic phonetics, and students with no previous experience with phonetics should read these soon.

Readings

Rodman, R.D. 1999. Computer speech technology. Artech House. (at the bookstore)

Holmes, J., and Holmes, W. 2001. Speech synthesis and recognition, 2nd ed. Taylor and Francis. (at the bookstore)

Ladefoged, P. 2001. A Course in Phonetics. 4th ed. Heinle and Heinle. Ch. 8 only. (on d2l site)

Karat, J., Lai, J., Danis, C., and Wolf, C. 1999. Speech user interface evolution. In Human factors and voice interactive systems, ed. D. Gardner-Bonneau. Kluwer Academic Publishers. pp. 1-35. (on d2l site)

Course requirements: 478

5 homework assignments* 50% (10% each)

Paper topic proposal 5%

Partial annotated bibliography 5%

Paper progress report 5%

Presentation on final paper 5%

Final paper 25%

Class participation 5%

* Some of the homework assignments will be carried out as small group projects.

Course requirements: 578

Same as above, except that all things worth 5% above are worth 4% each for 578, and a presentation on a research article (not one for your term paper) is also required, and is worth 5%.

The homework assignments, intermediate reports on the paper, presentation, and final paper are required of

all students. For students in 578, the paper must involve collection of original data related to some topic of the course, and the paper is likely to be about 15-20 pages long. For students in 478, the paper may either be a literature review on some topic in speech technology, or may incorporate collection of original data, and it is likely to be about 10-15 pages long. Some homework assignments may also include additional questions which are required only of the students in 578, but which can be done by students in 478 for extra credit.

All students must read all of the required readings and be prepared to discuss them in class. Questions on the readings will be included in the homework assignments.

All students should attend class every day except in cases of dire emergency or serious illness. Attendance will not be taken, but you cannot get a good grade for participation without being here to participate. If attendance becomes a problem, I reserve the right to give short pop quizzes and add these to the grading system, adjusting the percentages above as necessary. If I feel a need to do this, the change will be announced in advance.

All assignments must be turned in by 2 PM on the day due, except the final paper, which must be turned in by 4 PM on the day due. Late assignments will be docked 10% of the possible grade per day late, unless you have a very good documented reason for the lateness. Please do not submit homework by email or fax without asking ahead of time. If you do not turn in your homework during class, you should turn it in to my mailbox.

Approximate course schedule (subject to change)

Dates	Topic	Requirements
8/22- 24	Introduction, IPA transcription	
8/29	Acoustic phonetics	read Rodman Ch. 1, Holmes and Holmes Ch. 1, Ladefoged Ch. 8
8/31-9/5	Digital signal processing, articulatory synthesis	read Rodman Ch. 2
9/7-12	LPC synthesis, parametric synthesis	read Rodman Ch. 4, Holmes and Holmes Ch. 6, HW 1 due 9/12
9/14-19	Concatenative synthesis, waveform coding	read Holmes and Holmes Ch. 5
9/21-26	Prosody, PSOLA, Text-to-phonemes	read Holmes and Holmes ch. 7
9/28-10/3	Text-to-phonemes, other topics in synthesis	HW 2 due 10/3, Paper topic proposal due 9/28
10/5-10	Applications of synthesis, evaluation of synthesis	read Rodman Ch. 7, one half of 578 article presentations
10/12-17	Main issues of ASR, rule-based recognition, template matching, front-end analysis	read Rodman Ch. 3, Holmes and Holmes Ch. 8, 10, HW 3 due 10/12
10/19-24	HMMs, training HMMs	read Holmes & Holmes Ch. 9, Partial annotated bibliography due 10/19
10/26-10/31	Continuous speech, language modeling	read Holmes and Holmes Ch. 12, HW 4 due 10/26
11/2-7	Artificial neural networks, evaluating ASR	read Holmes and Holmes ch. 13

11/9-14	Applications, human factors	read Rodman Ch. 6, Karat et al., HW 5 due 11/9, second half of 578 article presentations
11/16-21	Speaker recognition, other language technologies	read Rodman Ch. 5, Ch. 8, paper progress report due 11/16
11/28-11/30-12/5	Student presentations	Term paper presentations
Finals week		Paper due Monday, 12/11, noon

We will have two guest speakers from speech technology industries during the semester. The dates of their visits will be announced later, and the schedule adjusted accordingly.

Note

Appropriate academic behavior is expected, e.g. cheating and plagiarism are unacceptable, disruptive behavior in class is unacceptable, and the student code of conduct (<http://info-center.ccit.arizona.edu/~studpubs/policies/studcofc.htm>) should be followed. It is also expected that students will treat others in the classroom with respect.