

CMSC289J/LING449J/MLSC410

Computational Approaches in Language Science

Tues. & Thurs. 9:30am-10:45, Spring 2016
JMZ 3120

Instructor Information:

Instructor: Naomi Feldman
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Office hours: Mon 4:00-5:00, Tues 3:00-4:00

TA Information:

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Course Description:

The purpose of this course is to survey areas of study that combine language science and computer science. We apply computational methods for exploring how humans learn and process language, and we create computational systems that mimic aspects of human language. We use both probabilistic and neural models to explore linguistic systems at the level of sounds, words, sentences, and meanings.

Learning Outcomes:

1. Students will demonstrate the ability to reason about linguistic systems at the sound, word, sentence, and meaning levels.
2. Students will demonstrate the ability to program basic computational models that measure and mimic aspects of human language.
3. Students will demonstrate the ability to propose and test new hypotheses about the types of computational systems that will best reflect aspects of human language.

Course Website:

The course web page is on ELMS at: <http://elms.umd.edu>
Schedule updates, readings, assignments, announcements, resources and grades will be posted here. Make sure to check the site regularly.

Required Textbook:

There is no required textbook for this course. Required readings will be posted online.

Student Responsibilities:

- Attend class
- Participate in class discussion
- Complete assignments and readings

Homework Policy:

Please submit all assignments online via ELMS. You may work together on assignments, but should write up solutions on your own. All work is due by the date and time indicated on the assignment. Late problem sets will be accepted, but will lose 10% credit for each day (or portion of a day) they are late, up to a maximum of 50%. Late practice problems will not be accepted.

Grading Policy:

Problem sets (5)	75%
Practice problems (10)	10%
Final project	15%
Total:	100%

Grading Scale:

98-100 = A+
93-97 = A
90-92 = A-
87-89 = B+
83-86 = B
80-82 = B-
77-79 = C+
73-76 = C
70-72 = C-
67-69 = D+
63-66 = D
60-62 = D-
59 and below = F

Attendance Policy:

- **Religious holidays:** The University of Maryland provides that students should not be penalized because of observances of their religious beliefs. Students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. It is the student's responsibility to inform the instructor of any intended absences for religious observances. You must inform the instructor in advance of the day to be missed.
- **Medical Excuses:** We will follow the newly instituted Medical Excuse policy for: <http://www.president.umd.edu/policies/v100g.html>. You must notify us *prior to* any absences for a scheduled quiz or exam. For non-consecutive absences or for a major assignment/exam, we will require a Health Center or medical doctor's health excuse. Remember that all assignments for this course can be submitted either in class, or online through ELMS.

Academic Honesty:

I follow the University's policies on academic honesty. All cases of academic dishonesty will be penalized. Please review the Code of Academic Integrity used by this university:

<http://www.studenthonorcouncil.umd.edu/whatis.html>

You are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism.

For purposes of assignments and papers, we define plagiarism as *intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise*. Homework assignments must be done independently. Students who are not certain about how to avoid plagiarizing should visit the following websites:

[*What is plagiarism?*](#) from the University of Maryland Libraries

[*Avoiding plagiarism*](#) from the Purdue University Online Writing Lab (OWL)

[*What is plagiarism?*](#) from Georgetown University

If you are having trouble with class material, please seek help from one of us *well before* exams or assignment deadlines. Plagiarized material (copied from a book, a webpage or a fellow student) will not be accepted for credit. Suspected violations of the Code of Academic Integrity will be referred to the Student Honor Council.

Remember: *Any idea or information that is not cited in written work is assumed to be your original contribution. Otherwise, it is plagiarism.*

Students with Disabilities:

If you have a physical disability or a learning disability, it is your responsibility to bring it to my attention at the beginning of the course (BEFORE any exams or assignments are due). I will make every effort to accommodate your needs.

Tentative schedule:

Date	Topic	Focus	Assignment due
Thurs., Jan. 28	Introduction	Cognitive modeling + NLP	
Tues., Feb. 2	Word learning 1	Introduction to Matlab	Install Matlab
Thurs., Feb. 4	Word learning 2	Vocabulary spurt 1	Practice prob 1-C
Tues., Feb. 9	Word learning 3	Vocabulary spurt 2	Practice prob 1-L
Thurs., Feb. 11	Word learning 4	Probability theory	
Tues., Feb. 16	NO CLASS (snow day)		
Thurs., Feb. 18	Language models 1	Language modeling 1	Problem set 1
Tues., Feb. 23	Language models 2	Language modeling 2	
Thurs., Feb. 25	Language models 3	Syntax	Practice prob 2-C
Tues., Mar. 1	Language models 4	Typology	Practice prob 2-L
Thurs., Mar. 3	Language models 5	POS-tagging, parsing	
Tues., Mar. 8	Disorders 1	Aphasia, double dissociations	
Thurs., Mar. 10	Disorders 2	Neural networks, backprop	Problem set 2
Thurs., Mar. 15	NO CLASS (spring break)		
Thurs., Mar. 17	NO CLASS (spring break)		
Tues., Mar. 22	Disorders 3	Past tense debate	Practice prob 3-C
Thurs., Mar. 24	Disorders 4	Lesioning a network	Practice prob 3-L
Tues., Mar. 29	Disorders 5	Challenges to connectionism	
Thurs., Mar. 31	Meaning 1	Vector space models 1	Problem set 3
Tues., Apr. 5	Meaning 2	Vector space models 2	
Thurs., Apr. 7	Meaning 3	Entailment and composition	Practice prob 4-C
Tues., Apr. 12	Meaning 4	Vector spaces in NLP	Practice prob 4-L
Thurs., Apr. 14	Meaning 5	Vector spaces and brains	
Tues., Apr. 19	Speech recognition 1	Phonetics, spectrograms	Problem set 4
Thurs., Apr. 21	Speech recognition 2	Signal processing	Practice prob 5-L
Tues., Apr. 26	Speech recognition 3	Variability in speech	Practice prob 5-C
Thurs., Apr. 28	Speech recognition 4	Hidden Markov models	
Tues., May 3	Speech recognition 5	Deep learning for speech	
Thurs., May 5	Word learning 5	Models of word learning	Problem set 5
Tues., May 10	Advanced topic		
Fri., May 13	FINAL PROJECT DUE		

NOTE: All assignments are listed on the date when they are due!