Syllabus

(as of August 31, 2022)

Class time   location : M/W 3:30-5:00   D(avid) R(ittenhous) L(aboratory) A5

Instructor:	Andrea Beltrama (he/him)	Graduate TA:	Gwen Hildebrandt (she/her)
Office:	342-C, 3401-C Walnut	Office:	324-C, 3401-C Walnut
Email:	beltrama@sas.upenn.edu	Email:	gwenhil@sas.upenn.edu
Office hours:	Thursday 2-3 pm and by appt.	Office hours:	Wed 2-3 pm and by appt.
		Learning Assistants (LAs):	Lex Giglio (they/them)
			Diana (Chuning) Yuan (she/her)

Course site on Canvas: https://canvas.upenn.edu/courses/1675227

EdDiscussion - Course discussion platform: https://edstem.org/us/courses/26965/discussion/
(Please use EdDiscussion for all class-related messages; if there's a need for private messages to just me or Gwen, please use email!)

1 Course Description

In this course, we study formal mathematical tools for the analysis of language that help us understand and classify the complex structures and rules that constitute language and grammar. These tools include set theory, formal language and automata theory, as well as aspects of logic, and will be applied to the syntax and semantics of natural language. In addition to learning something about formal tools for analyzing language, this will also enhance your general skills in analytical reasoning.

2 Class Structure

Before class:

- You will watch short lecture videos (20-30 minutes per class) asynchronously.

- You will take a short video quiz (2-4 questions) on each video lecture. The quiz will be graded and due **before** class

During class:

- You will engage in group work – for the most part, problem sets related to the topic covered in the video lectures – throughout almost the entire duration of each class. At the end of each class, each group will have to submit the output of their groupwork, which will also be graded.

The requirements additionally include weekly homework assignments (generally speaking, assigned on Monday, due the following Monday), as well as a midterm and a final take-home exams. Details of assignments, exams, and grade composition as specified below.

3 Logistics, Requirements & Grade Composition

There is no textbook. Video lectures and notes (as well as some readings) will be made available throughout the course on Canvas. Class time will largely be devoted to group work and exercises.

To do well in this class, it is crucial that you engage with the materials and problem sets for each class and actively participate in the group activities, and also do all of the quizzes and homework on Canvas in time. Both group work and homework assignments are designed to make sure that you are able to work with the new material. As much of what comes later builds on earlier parts of the course, it is difficult to catch up

once you fall behind. Therefore, the **short video quizzes & homework assignments** together make up a large part of your grade (**50%**). These assignments will be completed online through Canvas, though sometimes you will likely want to submit hand-written/drawn work, so be prepared to provide scans in those cases. There generally will be short quizzes for each video lecture (counting for **20%** of the course grade), as well as about one more general weekly homework assignment (**30%**). There will be a take-home **mid-term** and a take-home **final** (**15% each**). In addition, the group work in class will also need to be submitted each time, and be worth another **20%** of your grade (only group members that are present in class or work on the materials on their own get credit for group work on a given day).

So, to summarize:

- Short, pre-class quizzes: **20%**

- Weekly homework assignments: **30%**

- Mid-term: **15%**

- Final: **15%**

- In-class group activities **20%**

As you can see, there is quite a lot of work throughout the semester. The upside of that is that if you're on top of the homework and the daily quizzes, the mid-term and the final should be relatively straightforward.

3.1 Attendance / Participation

Since much of the in-class time will be dedicated to group activities, and parts of that work count towards your grade, it is paramount that you are actively engaged with each class session. If you are excused for an absence prior to a given class, you will get the opportunity to submit the relevant class-work individually. Also, you have to let me know that you're missing class by 9am the day of at the very latest, if at all possible, so I can make the relevant logistical changes on Canvas. Please let me know about any foreseeable absences as much ahead of time as possible.

3.2 Homework assignments, and how to do well on them

Homework has to be submitted by the beginning of class on the day it is due through Canvas. Getting the answers right is not everything - what's important is that we can see that you thought the problems through and are able to identify the steps of your reasoning. Be explicit about these steps, so that even if the end-result is wrong, we can see what you did and where you went wrong. Also, if you feel like your answer is going wrong at some point or you can't figure something out, try to describe what you're having trouble with. You can submit any such comments with your assignment on Canvas directly, or upload a file with your comments separately.

3.3 Late Work

Late work will not be accepted (barring truly exceptional circumstances which you generally need to tell us about before the due date if at all possible).

4 Academic Honesty

If you find it helpful to talk to other students about general issues on homework assignments, you are encouraged to do so. However, **you have to write up and turn in your individual answers**. If you do work with other students, please indicate in submission comments on Canvas who you worked with. DO NOT simply copy each others work – if we suspect that this is happening, we will first talk to you and, if necessary, inform the Office of Student Conduct. On the exams, you should work entirely independently in accordance with Penn's Code of Academic Integrity. If I have reason to believe that your behavior is violating this code, I will contact the Office of Student Conduct. See the following links for further information:

- University's Code of Academic Integrity: https://catalog.upenn.edu/pennbook/code-of-academic-integrity/

- The Office of Student Conduct's Frequently Asked Questions page: http://www.upenn.edu/osc/faq.html

5   Communication & Email

If you have a question about class logistics or a specific assignment (or any other topic that one of your peers might conceivably have as well), please post it as a new thread in the discussion board on Ed Discussion. **You'll have the option of posting messages anonymously, if you'd prefer to do so.** We encourage you to use this modality of communication as much as possible, since other people in the class could benefit from seeing the questions and the related answers.

If you have more personal questions or concerns, feel free to send me or the TA an email. We regularly check work email and the Ed discussion board until 6pm on work days; while we'll make an effort to do so also after working hours and on weekends, we may not see your after-hours messages until the next morning or next business day.

6   Masking policy

Following Penn guidelines, masks are no longer required. However, please know that I support continued mask wearing by anyone who prefers to do so. In fact, because the particular set-up of the class makes social distancing more challenging than in typical classroom environments, I strongly recommend wearing a mask, and I'll be wearing one myself whenever I'm not lecturing.

7   Holidays

Following Penn Policy on Secular and Religious Holidays, no graded work (homework or quiz) will be due on any of the dates indicated in the policy. For Fall 2022, these include Rosh Hashanah (25/9-27/9); Yom Kippur (10/4-10/5); and Election Day (11/8). Note that two of our classes fall in those windows: Sep 26 and Oct 5. On those dates, the usual pre-class quiz will have a delayed deadline so that it won't be due before class. To ensure you have time to be prepared for class, the video lectures for these classes will be made available a week earlier than usual. If, in observance of the holiday, you won't be able to come to class at all on those days, do let me know, and I'm happy to make alternative arrangements to submit in-class work individually.

The University recognizes that, besides these dates, there are other holidays, both religious and secular, which are of importance to some individuals and groups on campus. Such occasions include, but are not limited to, Sukkot, the last two days of Passover, Shavuot, Shemini Atzeret and Simchat Torah, Chinese New Year, the Muslim New Year, Diwali, Navaratri, Rama Navami, Paryushan, and the Islamic holidays Eid Al-Fitr and Eid Al-Adha. If you observe those holidays, do let me know within the first two weeks of the semester, and I'll be happy to make alternative arrangements. Information about the policy and dates can be found at the following link: `https://chaplain.upenn.edu/worship/holidays/`.

8   List of Topics

Check Canvas Calendar for an up-to-date schedule. Homework due dates will also be posted there.

- Introduction / Set Theory
- Relations and Functions
- Properties of Relations
- The Lexicon & Parts of Speech
- Syntax & Finite State Automata
- Finite State Automata & Regular Languages
- The Pumping Lemma
- Right-Linear Grammars

- Context Free Grammars
- English as a CFG
- CFG's & the Chomsky Hierarchy
- Syntax & Semantics: Structural Ambiguities
- Modeling Sentence Meanings
- Meaning Composition
- Structural Ambiguities Formalized
- Quantifiers