**Ling 160: Mathematical Methods in Linguistics**

**Fall 2014**

Instructor: Keith Plaster  
Email: kplaster@brandeis.edu  
Office: Volen 137 (Fall semester only)

Teaching Assistant: TBD  
TA office hours: TBD

1 Description and goals

This is an undergraduate and introductory graduate course presenting the key mathematical concepts which belong to the basic repertoire of linguistic methods. The course is recommended for students considering research in linguistics or cognitive science, or intending to continue on to graduate programs in linguistics and related fields. It is an approved elective for the undergraduate major and minor, as well as for the MA in Computational Linguistics. In addition, the course fulfills the University Quantitative Reasoning requirement.

The course has two goals: first, to strengthen the student's math background in the areas most widely relevant to linguistic theorizing, and second, to provide a broad overview of linguistic applications for various mathematical tools that would be of interest to students in linguistics, philosophy, and the cognitive and social sciences.

2 Prerequisites

None.

3 Readings

Our textbook will be *Rosen, Kenneth H. Discrete Mathematics and its Applications. 7th ed.*

Additional recommended and required readings will be made available on the course LATTE site from time to time.

4 LATTE

Please check the course LATTE site frequently. The course schedule, additional/supplemental readings, assignments, and other materials will be posted on the site as we progress through the semester.
5 Requirements and grading

Assignments
- Homework assignments 35%
- Paper reports 10%
- Participation and attendance 10%

Quizzes and exam
- Quizzes 25%
- Final exam 20%

Final percentage grade 100%

5.1 Assignments
Homework assignments will generally be assigned on Wednesdays and due on the following Wednesday. Assignments are due at the beginning of class, and will be graded on a 10-point scale. The lowest score will be dropped.

I encourage you to discuss the problem sets with other students in the class and to work with up to two other students, particularly on difficult problems, provided that (i) in your assignment you must identify the person(s) you worked with and (ii) each student must write up the assignment independently.

During the semester I will assign three linguistic papers that demonstrate the use of material that we are learning in the course, along with a related assignment for each.

Late homework will be accepted only until the graded assignment has been returned, provided that one point will be deducted for each day the assignment is late. Please note that homework submitted on the date it is due but after the beginning of class will be deemed one day late.

5.2 Participation and attendance
Class attendance is required and participation in class is expected. While you will not be penalized for being quiet in class, I hope very much that you will ask questions and want to participate in class discussions.

You may miss up to two classes for any reason. Each additional class missed will result in a reduction of your final percentage grade for the course by 0.5%, up to a maximum of 10% lost.

5.3 Quizzes and exam
There will be a short quiz every few weeks, along with a longer midterm quiz, which will count as two quizzes; all of the quizzes together will comprise 25% of your grade. The final exam will take place at the date and time scheduled by the Registrar. I will provide more details on each as the dates approach.

6 Electronic devices
No electronic devices (including laptops, tablets, and cellphones) may be used in class without my prior permission. Please keep all cellphones put away (and turn them off completely if the thought of a new message is irresistible).
7 Disabilities

If you are a student with a documented disability on record at Brandeis University and wish to have a reasonable accommodation made for you in this class, please see me immediately.

8 Academic integrity

You are expected to be familiar with and to follow the University’s policies on academic integrity (see http://www.brandeis.edu/studentlife/sdc/ai). Faculty may refer any suspected instances of alleged dishonesty to the Office of Student Development and Conduct. Instances of academic dishonesty may result in sanctions including but not limited to, failing grades being issued, educational programs, and other consequences.

9 Topics and general schedule

The general course outline is as follows:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Readings</th>
<th>Linguistic Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sets, functions, and relations</td>
<td>Rosen chs. 2 &amp; 9</td>
<td>Word meaning, questions</td>
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<tr>
<td>Partial orderings</td>
<td>Rosen ch. 9</td>
<td>Scalar implicature</td>
</tr>
<tr>
<td>Graphs, isomorphism, paths, trees</td>
<td>Rosen chs. 10 &amp; 11</td>
<td>Sentence structure, search</td>
</tr>
<tr>
<td>Lattices, Boolean algebra</td>
<td>Partee et al. ch. 11, Rosen ch. 12</td>
<td>Plurals and mass terms</td>
</tr>
<tr>
<td>Counting, discrete probability</td>
<td>Rosen chs. 6 &amp; 7</td>
<td>Certainty and truth, implicatures</td>
</tr>
</tbody>
</table>

If we are able to complete these topics before the end of the semester we will look at decision and game theory as our last topic.