Math 113 Syllabus

Fall 2013

Lecture: Tuesday, Thursday 2:15-3:30pm 380-380F Sloan Hall Basement

Professor: Daniel Kane
Email: dankane "at" math.stanford.edu
Office Hours: 380-382N (second floor) Tuesday, Thursday 12:00-1:00 Friday 2:00-3:00 Or by appointment.

Course Assistants:
Chao Li
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Office Hours: 380-381B (first floor) Monday, Wednesday 1:00-2:30
Bowei Liu
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Office Hours: 380-380G (basement) Tuesday, Wednesday 5:00-6:30

Course Description: Math 113 will cover linear algebra from a theoretical perspective. Topics will likely include: vector spaces, subspaces, dimension, linear transformations, eigenvectors, inner products, spectral theory, and determinants. The emphasis throughout the course will be on proofs and abstract theory rather than on computation or concrete examples.

Another important component of Math 113 will be the use of mathematical proofs. Much of the material will emphasize proofs of various results, and students will be expected to learn how to write clear and rigorous proofs. For a brief introduction to how to write proofs, please consult the handout on [writing proofs](http://math.stanford.edu/~dankane/113/).

Prerequisites: Math 113 is appropriate to take even for students who have already taken a first course in linear algebra, such as Math 51, although having done so is not necessary.

Textbook: The textbook for the class is *Linear Algebra Done Right* (second edition) by Sheldon Axler. It is available at the [campus bookstore](http://math.stanford.edu/~dankane/113/). We may also supplement this with additional handouts.

Grading: Course grades will be determined using the following breakdown:

- Homework: 30%
- Midterm: October 29th 7-9 pm 30%
- Final Exam: Wednesday December 11, 7-10 pm 40%
Homework:

Submission Policy: Homework will be assigned weekly and will be due each Thursday (excepting the first and last weeks of class, Thanksgiving break and the week of the midterm). Homeworks will be assigned at least one week before they are due, and will be due by the start of class on Thursday. Homeworks submitted at the end of class will be accepted but will suffer a 10% score reduction. Homework submitted later than the end of class will not be accepted. If you cannot make class, either find someone else to submit your work for you or contact me to make other arrangements. To accommodate exceptional situations such as accidents or serious illness, your lowest two homework scores will be dropped.

Write-up Guidelines: As learning to write mathematical proofs is a goal of the class, you will be expected to write proofs in your homework problems. You will be expected to justify the correctness of your solution even for problems that do not explicitly ask you to prove anything. For further guidelines about what constitutes a mathematical proof, please consult the handout on writing proofs. In addition to this you should make sure to:

- Write your name on the top of each page.
- Submit solutions that are either written legibly or typed and are clearly written. You will receive no credit for solutions that we are unable to decipher.
- If your submission is more than one page long, make sure to number all pages and staple them together.

Collaboration Guidelines: Students are encouraged to collaborate on homework assignments. You should feel free to discuss the problems and talk about how to come up with solutions with each other. That said, you are expected to write up your solutions independently. You should make sure that you understand the solutions well enough to provide a clear explanation of how and why it works.

Schedule: Below is a very tentative schedule for the course:

<table>
<thead>
<tr>
<th>Week of</th>
<th>Material</th>
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<tbody>
<tr>
<td>September 23</td>
<td>Chapter 1: Vector Spaces and Subspaces</td>
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<tr>
<td>September 30</td>
<td>Chapter 2: Dimension and Bases</td>
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<td>October 7</td>
<td>Chapter 3: Linear Transformations and Matrices</td>
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<td>October 14</td>
<td>Chapter 4: Polynomials and Factorization</td>
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<tr>
<td>October 21</td>
<td>Chapter 5: Eigenvalues and Eigenvectors</td>
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<td>October 28</td>
<td>Chapter 8: Generalized Eigenvectors and Jordan Forms</td>
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<tr>
<td>November 4</td>
<td>Chapter 9: Operators on Real Vector Spaces</td>
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<tr>
<td>November 11</td>
<td>Chapter 6: Inner Products and Orthonormal Bases</td>
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<td>November 18</td>
<td>Chapter 7: Operators on Inner Product Spaces, The Spectral Theorem</td>
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<td>November 25</td>
<td>Thanksgiving week, no class</td>
</tr>
<tr>
<td>December 2</td>
<td>Chapter 10: Traces and Determinants</td>
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<tr>
<td>December 9</td>
<td>Finals Week</td>
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The above schedule is subject to change depending on the rate at which we cover material and on student interest (so if there’s something not mentioned here that you really want to learn about, let me know).
Resources: In addition to the textbook, lectures, and your fellow students there are a number of other resources available to assist you with learning the material.

- Perhaps the best way to get individualized explanations is by going to office hours. Feel free to drop by regular office hours without an appointment. Shorter questions can also be directed to me via email.

- The Stanford University Mathematical Organization (SUMO) organizes a weekly homework night on Tuesdays from 8 to 10pm in 380-381U, where you can work with other students on problems. For more information visit their website at http://sumo.stanford.edu/.

Honor Code: Students should be sure to familiarize themselves with the Stanford Honor Code available online at http://studentaffairs.stanford.edu/communitystandards/policy/honor-code. You are responsible for understanding and following University rules on academic integrity. In short, the Honor Code disallows all forms of academic dishonesty including copying from another student’s exam and unpermitted collaboration on homework.

Students with Documented Disabilities: Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Office of Accessible Education (OAE). Professional staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty dated in the current quarter in which the request is being made. Students should contact the OAE as soon as possible since timely notice is needed to coordinate accommodations. The OAE is located at 563 Salvatierra Walk (phone: 723-1066, URL: http://studentaffairs.stanford.edu/oae).