Instructor:
Professor Becci Torrey, Goldsmith 222, rtorrey@brandeis.edu.

Prerequisite:
Math 15a, 20a, or 22a, or permission of the instructor.

Textbook:

Learning Goals for Math 23b:
Our primary goal in this course is to take the first step into the world of advanced mathematics. We will learn about the culture and values of the community of mathematicians, the central tenet of which is that conjectures must be proven logically, at which point they are declared theorems and we can use the results. To this end, we will:

- Learn how to read math;
- Learn to recognize when a conjecture is proven;
- Learn how to write our own mathematical proofs; and
- Improve our ability to learn on our own and with others.

We will introduce basic concepts in logic and study techniques of proof as they arise in various areas of mathematics, beginning with the discrete (used in abstract algebra, number theory, combinatorics, etc.) and ending with the continuous (used in analysis, topology, etc.). We will study most sections of Chapters 1, 2, 3, 5, 6 and 8 in our textbook.

**How we will achieve these goals:**
In all cases, we will learn by doing, reflecting on our work, getting feedback on our work, and trying again. We will also learn from others, by observing how they approach problems and how they approach reading. Here are a few more particulars about how the class is structured to help us achieve our goals:

- Each week there will be a reading assignment. It is essential that you complete the reading assignment on time so that you are prepared for class. Part of the reading will be posted online and everyone will be required to post questions, thoughts and/or insights (QueTI). This will provide the opportunity to see what others are thinking about when they are reading math. Pay attention! Try on different approaches to figure out what works best for you.

- You’ll see below that a very large portion of the grade is based on homework. This is the most important aspect of the course. We will be learning how to write proofs and analyze them for correctness by trying to write them and then re-writing them. We’ll have feedback on the homework and you’ll have the opportunity to re-write the hardest proofs.
• In class, we’ll spend most of our time working in groups on problems that are very similar to the homework problems. This will give everyone the chance to observe how others approach problems and to figure out anything they didn’t understand in the reading. Again, pay attention! Observe how your classmates think about problems and try out different approaches for yourself until you figure out what works best for you. We will also have whole class activities (e.g., lectures on hard topics, whole-class proof writing/problem-solving, discussion of which proof is better and why, etc.).

This class structure is sometimes called a “flipped class”. See further details about this below.

Grades:
The breakdown of your grade in the course will be as follows:

• **45%** Homework – graded for mathematical correctness and clarity

• **10%** Participation – this will consist of three components: reading, classwork and reflections.

• **20%** Two in-class quizzes (10% each) – *tentative* dates:
  - Thursday, March 3
  - Thursday, April 14

• **25%** Final Exam – Tuesday, May 10, 1:30-4:30 pm

Additional details about the structure of this course and grading can be found below.

Office hours:
You are cordially invited to come to office hours whenever you have questions about the course material or just to say hello and have some tea. If you can’t attend office hours, please do ask for an appointment at another time.

Meetings:
I’m always happy to meet one-on-one with any of you. If you ever feel that you’re lost, you’re not learning enough or you’re not meeting your own expectations, please meet with me as soon as possible. I am happy to work together with you on a plan to make sure you succeed. I am here to help you learn.

LATTE:
All course materials will be available on LATTE: [https://moodle2.brandeis.edu](https://moodle2.brandeis.edu).

Four-Credit Course (with three hours of class-time per week):
Success in this 4 credit hour course is based on the expectation that students will spend a **minimum of 9 hours of study time per week** in preparation for class (readings, papers, discussion sections, preparation for exams, etc.).

Academic Integrity:
You are expected to follow the University’s policy on academic integrity, which is distributed annually as section 4 of the Rights and Responsibilities Handbook (see [http://www.brandeis.edu/studentaffairs/srscs/rr/index.html](http://www.brandeis.edu/studentaffairs/srscs/rr/index.html)). Instances of alleged dishonesty will be forwarded to the Department of Student Development and Conduct for possible referral to the Student...
Judicial System. If you have any questions about how these policies apply to your conduct in this course, please ask.

Students with disabilities:

If you are a student who needs academic accommodations because of a documented disability you should present your letter of accommodation to me as soon as possible. If you have questions about documenting a disability or requesting academic accommodations you should contact Beth Rodgers-Kay in the Office of Academic Services at x63470 or at brodgers@brandeis.edu. Accommodations cannot be granted retroactively.

Flipped Class:

The basic idea behind flipping the classroom is to take the traditional lecture structure (where students get an introduction to the material in class and then are expected to do the hard stuff on their own) and flip it around (so students read the book for an introduction and come to class to do the hard stuff). The goal of this is to use class time more efficiently. You are all capable of handling the easy, introductory material on your own (and I think you’ll find our textbook quite readable). We will then take advantage of our collective intelligence by working with each other on the harder problems in class. Research shows that students learn twice as much with active learning pedagogy like this than in traditional lecture courses.

This means that my role in the class is different from that to which you are probably accustomed. It is often said that in the flipped class structure, you should think of the instructor’s role as “Guide on the Side” instead of “Sage on the Stage”. My role is to provide the structure and guide you through the learning process. You can think of me as your coach – if you were going to run a marathon, you would not expect to watch your coach run laps, you would expect your coach to tell you how many laps to run.

Remember: it’s ok (actually, it’s great!) to come to class with questions, but it’s not ok to leave class with the same questions.

IMPORTANT: This class structure can only succeed if everyone in the class does their best to participate on a daily basis and meet the expectations outlined here. You should view this syllabus as a contract. In particular, by taking this class you are signing your name to the following pledge:

I pledge to do my best to meet the expectations outlined in this syllabus. I agree to:

• complete the readings on time;
• work in good faith and good humor with my classmates in small groups on the assigned exercises during class;
• assist classmates when I understand something they do not;
• ask others for explanations when they understand something I do not; and
• enjoy learning something new!

I’m really looking forward to working with all of you this semester!