Analysis I (MATH-UA 0325.001), Fall 2017
Syllabus

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Office hours: Mon, 1-2pm Tue 2pm-3pm,  
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This one-semester course introduces the basic concepts and methods of rigorous analysis. The material is basically calculus, but at a much deeper and more rigorous level than in your previous calculus classes. In fact, we start by studying the real numbers, sequences and series, and continuous functions, and we only arrive at derivatives and integrals in the second half of the class. While this material is important (and interesting and fun), the point of the class is not truly to become experts in it. Rather, it is to develop your ability to analyze and prove statements of mathematics, the skill that mathematicians bring to the rest of the world.

Your previous classes are sometimes called cookbook-style classes: we teach you some recipes for solving problems, and you learn and apply these recipes. In this class, I will give you some ingredients and teach you some essential techniques, and you will devise a dish on your own. It will be quite different from your previous classes, and it will also be quite a lot of work. Some people like this less than the cookbook style of class, but some people like it much more. It offers a chance for deeper thinking, and it demands creativity. You may surprise me by solving something in a way that I have never seen before.

Textbook

*Basic Analysis* by Jiří Lebl, This textbook is available for free at [http://www.jirka.org/ra/](http://www.jirka.org/ra/). From a link there, you can also buy a paper copy for about $12, which you will need to do if you want to consult the book during exams, which are open note and open book but with no electronic resources allowed.

In short, the plan is to cover the following sections in the textbook:

0.3, 1.1–1.4, 2.1–2.5, 3.1–3.4, 4.1–4.2, 5.1–5.3, 6.1–6.3.

We will follow the textbook very closely.

In this class, you will find it very helpful to look over the contents of my lecture in the textbook before I deliver it in class. Basically, the idea is that you want to do a top-level reading only. Don’t try to learn the details of the proofs. Just try to figure out what the important definitions are in the section, and try to get a sense of what they mean. Look for the main theorems of the section, and do your best to work out what they’re saying. The idea is that when you hear my lecture, it’ll feel like you’re filling in the details of an outline, and you’ll be able to follow everything that I say. All of this is the ideal and nobody every quite lives up to it, but I bet that fifteen minutes of reading in the morning before class will make my lecture more rewarding.

Assessments

Here is how I will weight each graded component of the class:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written Homework</td>
<td>20%</td>
</tr>
<tr>
<td>Recitation</td>
<td>5%</td>
</tr>
<tr>
<td>In-class Midterm 1 (Oct 11)</td>
<td>20%</td>
</tr>
<tr>
<td>In-class Midterm 2 (Nov 20)</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam (Date TBA)</td>
<td>30%</td>
</tr>
</tbody>
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Homework

The homework is the most important thing in this class. You will be asked to solve problems in the form of proving assertions. It is not just about solving the problems but the emphasis is also on presenting your solution in the form of a rigorous mathematical proof. It is intended to be difficult, especially if you have no prior experience with proof. You will often find yourself floundering on a problem for an hour before making any progress. This is an important part of the process. Unless you go through this struggle on the homework, you will end up doing it on the exams, where floundering for an hour has much worse effects.

You are encouraged to work together to solve the homework problems but you must write up your solutions entirely on your own, in your own words. The hardest part of writing mathematics lies in the discrepancy between your explanation making sense to you versus to your reader. Therefore you are strongly encouraged to seek feedback from fellow students on the draft of your solutions. If your peers (provided they are following along with the course recently) cannot understand what you wrote, it is probably a bad or badly written solution. Having said that you are, of course, not allowed to simply copy someone else’s solution. **You are expected to be able to explain everything you hand in and you might be called upon to do so in case of any doubts.**

You may not seek out any sort of homework help on the internet. Solutions to every analysis exercise are out there, but even if you carefully study them and learn how they work before writing them up on your own, you will not go through the process of struggling for a solution, and you will not be able to do it on exams. When you find yourself stuck on a problem, I encourage you to email me or Tristan or come to our office hours. Tell us what you have been trying, and we can tell you if you are going in the right direction or give you a hint to push you there. We will give you lots of help like this. The only prerequisite is that you have spent some time struggling with the problem.

The homework is always due at the recitation. I will not accept ANY late homework, without exception. However, I will drop your lowest homework score, since I understand that events may force you to miss an assignment. If you cannot make it to recitation to hand in your assignment, give it to a classmate to hand in, or arrange a way with Tristan before the start of her class. We will not accept homework via email. Please staple your homework, and write neatly. It is very frustrating to grade homework that is messy or unstapled. Your grader reserves the right to deduct points if your homework is unpleasantly messy or not stapled. You are encouraged to use \TeX to typeset your proofs.

Recitation

You will have a recitation section with Tristan on Fridays. Typically, you will spend the class working on problems in groups, and you will get credit for participation in this. Tristan will circulate around the class to help you and give feedback on your solutions. Occasionally, there might be a short quiz that you will be evaluated on instead. The TA will also discuss homework problems and go over solutions. This will be a more serious part of the class than most recitation sections. When computing your grade, I will drop your lowest score, so that you can safely miss one recitation section.

Exams

You will have three in-class exams: two midterms (Oct 11, Nov 20) and a final. Exams will be open book and open note, but you may not use electronic devices. (This means that you will have to invest in a paper copy of the book if you want to consult it during tests.) I will post solutions immediately after the exam. Consequently, I cannot let you take an exam late.

Excused absences

If you are forced to miss a recitation or exam due to an unavoidable, compelling, and well-documented circumstance, contact me immediately and we will discuss the situation. The most likely solution is that
your remaining exams will be weighted more heavily to make up for it. I do not give make-up exams: this policy allows me to return everyone's exams and post solutions as quickly as possible.

Here are some valid reasons to miss a test: observance of religious holidays, participation in certain university sponsored activities, and medical or family emergencies. Please try to make arrangements at least a week in advance, if possible. Of course, if you have an emergency, just write to me as soon as you can. We will not be able to make accommodation for purposes of more convenient travel, including already purchased tickets. Please note again the date of the final and plan your summer break travel accordingly.

Curve

Perhaps, perhaps not. However, I guarantee that I will not make up my mind about it until after the final exam and asking about it will be a waste of time.

Emailing

Both me and the TA are happy to answer any questions that has not been answered in this syllabus. We reserve the right to leave emails unanswered that does not take this into account.

Disabilities

If you have a documented disability and wish to discuss academic accommodations, contact me as soon as possible. Students who are in need of special arrangements must present a letter from the Moses Center(or arrange a letter to be sent) at the start of the course. Students who take their exam at Moses Center, needs to schedule this approximately one week before the exam takes place. It is the students responsibility to make the arrangement.

Honor Code

We do not tolerate academic dishonesty. You are expected to uphold academic integrity as specified by the university and the College of Arts and Sciences. See [http://cas.nyu.edu/page/academicintegrity](http://cas.nyu.edu/page/academicintegrity) : I will report every instance of academic misconduct I observe to the university. In particular, I will do my utmost to get you in trouble if you seek out solutions to the homework from the internet. Seek out help from me or Tristan instead!

Note on the grades \( W \) and \( I \)

You may drop the course in the first three weeks without it appearing on your transcript. After that, and through the ninth week, you may withdraw and receive a grade of ‘W’ on your transcript. No withdrawals are granted after the ninth week. A grade of ‘Incomplete’ (I) is granted only in the rare circumstances that an emergency prevents a student in good standing from finishing the course in its last few weeks. As per the CAS Bulletin: Students who are ill or have a serious personal problem should see, call, or write to an adviser in the College Advising Center, College of Arts and Science, New York University, 1 Silver Center, 100 Washington Square East, Room 905, New York, NY 10003-6688; 212- 998-8130.