MAT320/640 FALL 2020

SYLLABUS

Welcome to MAT320/640!

To help get things started, I have assembled below some important information about this course, including details on Exams, Grades, Homework Assignments, etc. Please **READ CAREFULLY** and in its entirety. This and much more information can be found in the course webpage:

`http://www.lehman.edu/faculty/rbettiol/lehman_teaching/2020mat320.html`

If you have any further questions, please send me an e-mail at `renato.ghinibettiol@lehman.cuny.edu`.

1. **About this course.** As described in the official Lehman College course description, the contents of this course include basic topology of real numbers, continuity, differentiation, the Riemann-Stieltjes integral, uniform convergence and continuity, up to the Arzelà-Ascoli and Stone-Weierstrass theorems. In short, this corresponds to a typical first course in Real Analysis for students pursuing a Mathematics major (also taken by many students seeking to major in related fields, such as Physics or Statistics). This is a reasonably advanced course, cross-listed as a graduate course, and is **proof-based**, which makes it very different from previous courses that you might taken, such as MAT226 (Vector Calculus), which is a prerequisite for this course. The key point is that you will learn how to logically deduce mathematical facts from basic axioms and write rigorous proofs, while in Calculus courses you typically only learn how to manipulate symbols in computations and perform basic operations such as using partial derivatives, integration techniques, etc. While Calculus is for those that *use* mathematics, Real Analysis is for those that *develop* mathematics. As an analogy, think of the difference between *using* some software, like the web browser or PDF viewer where you are reading this file, and *developing* or *coding* that same software.

Thus, even though many of the topics covered may sound familiar to you at first, such as continuity, differentiation, sequences and series (you should already know what all these things mean!), we will be studying them at a much deeper level and supplying complete and rigorous proofs of all results, using ε and δ definitions and so on. This might be your first encounter with this level of mathematical rigour, which is a skill we will carefully develop step-by-step along the semester, since it is absolutely fundamental in graduate-level courses in fields such as Mathematics, Physics, and Statistics, to which this course is ultimately preparing you for. I hope you are as excited as I am to go through this journey together!

2. **Lectures.** All lectures will be **online** and **asynchronous**, due to the ongoing COVID-19 pandemic. This mode of instruction has been authorized for all courses offered by the Department of Mathematics in the Fall 2020 semester. Lectures will be posted to the website linked above twice a week on a Monday-and-Wednesday schedule (following the Lehman Academic Calendar, available at `http://www.lehman.edu/registrar/calendars.php`), and will consist of several short videos to be watched sequentially and worked through. This means you will often have to perform some small task on your own, in between videos, such as writing a short proof or finding a counter-example. Even though this mode of instruction allows great flexibility, since you may work through the lectures at your own convenience, you are strongly encouraged to do so as soon as it is posted online (or at least keeping up with the week-by-week schedule), since this course is very challenging, abstract, and fast-moving in comparison with most other math courses you have taken so far. A tentative day-by-day schedule is available on the website linked above, and may be revised.

3. **Textbook.** The main textbook for this course is a widely used and highly praised classic:

- **Principles of Mathematical Analysis, by Walter Rudin (McGraw-Hill, 3rd edition, 1976)**

which is often nicknamed "baby Rudin". It can be easily found in print and electronic format online, and it is very strongly suggested that you obtain a copy to follow along during the semester. The plan is to cover the first 7 chapters of the book. There are numerous other good Real Analysis references, such as

"Real Mathematical Analysis", by Charles Chapman Pugh (Springer, 2nd edition), which is an excellent companion book to baby Rudin, and often contains longer explanations and examples.

4. **Homework.** There will be bi-weekly homework assignments, posted on the course website every other Wednesday, which will be due online (via Blackboard) on the following Wednesday. Your solution must be delivered as a PDF file, to be upload to Blackboard. You may write your solution as a TEX file and compile it to produce a PDF output (recommended), or you may also write your solution on paper and scan it using a smartphone or similar device (suggested apps to create multi-page PDF documents using Camera images are linked on the website). **Each homework assignment will consist of proof-based exercises, and all of them will be graded.** Even though you may discuss the problems with other students (and you are encouraged to do so using the Blackboard forum, where I will also be answering questions and moderating the discussion), you **must write your solution individually**. Identical solutions or solutions copied from online forums and other websites will receive a zero grade and will be referred to the Office of Student Affairs for disciplinary sanctions (please refer to the Academic Integrity section below). The **first homework** assignment, HW0, is a mock assignment **due on August 31**, so you can make sure everything is working properly regarding the logistics of receiving and delivering assignments via Blackboard. It will receive a (symbolic) grade of 1 point, so you can familiarize yourself with how the grading and feedback boxes work on Blackboard.

5. **Exam.** There is only one (Final) Exam in this course, that will take place (remotely) on **December 14**. Please be sure to mark your calendars to have 2 hours of uninterrupted time to complete your exam that day. Detailed logistics on how the exam will be delivered will be announced later during the semester.

6. **Grades.** Course letter grades will be determined based on the homework (60%) and Final Exam (40%).

7. **Links.** There are 2 websites you will use for this course:

(A) The course MAIN WEBSITE:
`http://www.lehman.edu/faculty/rbettiol/lehman_teaching/2020mat320.html`
This is where the lectures, bi-weekly homework, and solutions, will be posted, as well as any other learning resources.

(B) Blackboard: `https://bbhosted.cuny.edu/webapps/login/noportal`
This is where you will submit all your assignments (homework and exam), receive announcements (also by email), and see your grades.

8. **Students with disabilities.** Lehman College is committed to providing access to all programs and curricula to all students. Students with disabilities who may need classroom accommodations must register with the Office of Student Disability Services. For more information, please contact the Office of Student Disability Services, Shuster Hall, Room 238, at 718-960-8441.

9. **Academic integrity and class policies.** The highest levels of academic integrity, as detailed in the

(1) CUNY Academic Integrity Policy
`http://www2.cuny.edu/about/administration/offices/legal-affairs/policies-procedures/academic-integrity-policy/`

(2) Lehman College Undergraduate Bulletin
`https://lehman.smartcatalogiq.com/2019-2021/Undergraduate-Bulletin/Academic-Services-and-Policies/Academic-Integrity`

must be upheld in all activities related to this course. Students are encouraged to discuss homework problems with each other, but are required to write their solutions independently. CUNY-wide and Lehman College policies and procedures that are in effect regarding academic integrity, attendance, student conduct, secular and religious holidays, reasonable accommodations and academic adjustments, etc will be followed strictly. Identical solutions or solutions copied from online forums and other websites will receive a zero grade and will be referred to the Office of Student Affairs for disciplinary sanctions. Absence from an exam will result in a zero grade for that exam, except in extraordinarily unusual circumstances, with both a valid written excuse and instructor approval. Any requests for grade revision must be submitted in writing (by email).