

MAT320/640 FALL 2021 SYLLABUS

Welcome to MAT320/640!

This document contains important information about this course, including details on how classes will be held, as well as details regarding exams, grades, homework assignments, etc. Please **READ CAREFULLY** and in its entirety. This and much more can be found in the periodically updated course webpage:

http://www.lehman.edu/faculty/rbettio/lehman_teaching/2021mat320.html

1. **What is covered in this course?** As described in the official Lehman College course description, this course is an introduction to Real Analysis, whose main contents are number systems, limits, continuity, series, differentiation, and integration. This material is standard for a first course in Real Analysis for students pursuing a Mathematics major, but is also often taken by students seeking majors in related STEM 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 have taken, such as MAT226 (Vector Calculus), which is a prerequisite. 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. You will be doing the mathematical equivalent of the latter, going into the nuts and bolts of every “fact” you previously learnt in Calculus.

So, even though many of the topics covered may sound familiar to you at first, such as continuity, differentiation, sequences, and series (you should already more or less know what these things are!), we will be studying them at a much deeper level and supplying complete and rigorous proofs. This might be your first encounter with this level of mathematical rigor, 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. **How will classes be held?** This is a **hybrid course**, meaning that most activities will be held remotely (online), either synchronously or asynchronously, and there will also be some optional in person activities.

All new material will be presented in **online lectures**, and there will be two types of lectures:

- (1) **Live on Zoom:** Approximately 1 in every 5 lectures will be held live on Zoom, during class scheduled times. A registration link will be sent to students registered in the course. Attendance and participation is very highly encouraged, but not mandatory. These lectures will be recorded, and the recording will be posted on the course website and remain available throughout the semester.
- (2) **Pre-recorded:** The remaining (majority of) lectures will be pre-recorded, and posted on the course website as a sequence of short videos. These lectures will be posted approximately at the time that classes are supposed to be held, and will remain available online throughout the semester.

There will also be two **optional in person exercise/review sessions**, tentatively scheduled for October 6 and November 15. Participation in these activities is not mandatory, and is capped at 10 students, who must comply with all CUNY requirements for attending on campus activities. Details and a registration link will be sent later in the semester. Students that wish to attend the first session but are left out because of the 10 person cap will receive priority in the registration for the second session. Students not attending the in person session will use the allotted time to work on their homework assignment for that week.

A detailed **day-by-day schedule is available on the course website**, indicating precisely which modality each class will follow, and which material will be covered. This day-by-day schedule is subject to change during the semester, and the latest updated version will always be available on the course website.

3. **Which book will we use?** The main textbook we will use in this course is:

- **Elementary Analysis: The Theory of Calculus,**
by **Kenneth A. Ross (Springer, 2nd edition, 2013)**

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 essentially all the material in this book, except for the sections marked with an asterisk (*). Secondary/auxiliary books that I recommend are:

- Principles of Mathematical Analysis, by Walter Rudin (McGraw-Hill, 3rd edition, 1976);
- Real Mathematical Analysis, by Charles C. Pugh (Springer, 2nd edition, 2015).

4. **How will grades be computed?** Course letter grades will be determined based on the homework (60%) and Final Exam (40%). Details on these are given below.

5. **Homework.** There will be bi-weekly homework assignments, posted on the course website every other Monday, which will be due online (via Blackboard) on the following Monday. Your solution must be delivered as a PDF file, to be upload to Blackboard. You may write your solution as a T_EX 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 will be sent to registered students via email). **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 30**, 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 everything works.

6. **Exam.** There is only one (Final) Exam, that will take place (remotely) on **December 15**. You will have a 24-hour window to take the exam, which has a duration of 2 hours, and will consist of problems similar to the homework assignments. Detailed logistics will be sent to registered students later in the semester.

7. **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>

- (3) Lehman College Coronavirus (COVID-19) policies

<https://www.lehman.edu/coronavirus/>

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 COVID-19 mitigation, 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. Failure to submit homework assignments or the final exam will result in a zero grade for that activity, except in extraordinarily unusual circumstances, with both a valid written excuse (by email) and instructor approval. Any requests for grade revision must be submitted in writing (by email).

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 accommodations must register with the Office of Student Disability Services. For more information, please contact the Office of Student Disability Services at disability.services@lehman.cuny.edu or (718) 960-8441.

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