MATH 4341 – Real Analysis II

Spring 2021

Instructor: Dr. Scott M. LaLonde

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Office hours: Tuesdays & Thursdays 1:00–2:30 P.M., or by appointment. All office hours will be conducted remotely via Zoom.

Scheduled lectures: MWF, 11:15 A.M. – 12:10 P.M. in RBN 4019.

Course Information

Course Webpage: All course information and documents will be posted on Canvas.

Textbook: There is no required textbook for this course. Some suggested resources will be available on Canvas at a later date.

Prerequisites: A grade of C or better in MATH 3345 or equivalent.

Course Description: Continuation of MATH 3345. Study of metric spaces, sequences, series, continuous functions, differentiation, and integration.

Student Learning Outcomes: Upon completion of this course, students should be able to do the following:

- Write complete, correct, and coherent proofs involving analysis.
- Understand and use abstract mathematical concepts.
- Understand and use basic properties of sequences and series of functions.
- Discuss and use properties of functions on $\mathbb{R}^n$, particularly those involving continuity, differentiation, and integration.
- Exhibit some familiarity with selected topics involving metric spaces and/or functional analysis.

Assignments and Grading

Homework

Homework will be assigned more or less on a weekly basis. Abstract mathematics is best learned through practice, so it is imperative that you make an honest effort to complete each assigned problem. Homework assignments need to be written legibly or typed, and all proofs must be written in complete sentences. I reserve the right to reject any papers that are illegible. Homework will generally be collected on Wednesdays via Canvas.

Each assignment will consist largely of proofs, though there will also be computational problems where you will work with specific examples. I will divide each assignment into three sections according to the difficulty of the problems:

- **Easy:** These are basic problems designed to check your understanding of the key concepts.

- **Medium:** These problems will require you to apply the concepts you have learned in class, usually to prove new facts. The majority of the homework problems will fall in this category.
- **Hard:** These problems are fairly difficult. They likely require some creativity, or you may need to explore concepts beyond what we have done in class.

You have hopefully come to learn that an attempt at writing a mathematical proof either ends with a correct proof, or it does not. However, I will grade each problem on a scale of 0 to 4 to allow for partial credit. The score will depend on both content and presentation as follows:

- **4:** You have constructed a correct proof of the given statement, and it is written clearly, coherently, and in complete sentences.
- **3:** Your solution is mostly correct, but there are some small defects that keep your argument from being completely airtight. It is also written clearly and in complete sentences.
- **2:** You are headed in the right direction, but there are fundamental flaws in the argument or exposition. Your proof is partially correct, or you've cut corners in the written presentation.
- **1:** Your proof is fundamentally flawed and/or poorly written.
- **0:** Your proof is completely incorrect or incoherent, or you did not make a reasonable attempt at solving the problem.

Exams

There will be two exams during the semester, both of which will be administered orally. Each student will schedule an individual time to meet with me (most likely on Zoom) to take the exam. These exams will consist of two components:

- You will choose a topic from a list (which I will provide ahead of time), prepare a proof in advance, and present your work to me during the meeting.
- After your presentation, I will ask you exam-type questions on the course material.

Each exam will likely consist of a combination of conceptual questions, computational questions, and proofs. We will discuss the content and structure of each exam in more detail during the semester. Tentatively, the dates I have in mind are as follows:

- Exam 1: Week of February 22
- Exam 2: Week of April 5

Grading

Your grade for this course will be computed as follows. The scale for determining your letter grade will be no more harsh than the traditional one shown below.

Assignment	Total %
Exam 1	25
Exam 2	25
Homework	50
Total	100

Numerical	Letter
90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
Below 60	F

Course Policies

Canvas

You must activate your Canvas account and check it regularly. You can activate your account and log in at `https://www.uttyler.edu/canvas`. If you are registered for the course, then you should already have access to the Canvas page. All announcements and important documents will be posted there.

Email

Along with the built-in Canvas messaging system, the preferred means of communication for this course is official UT Tyler email. If you email me, it needs to be sent from your Patriots account to my UT Tyler email address (`slalonde@uttyler.edu`). In the event that I need to contact you, I will send an email to your Patriots account, and I will assume that you have read any such message.

Office Hours

I have regularly scheduled office hours, which are set aside as time for you to talk to me about the course. Attending office hours should be your first course of action if you find that you are struggling. You should not be afraid to come ask me questions when you are studying or working on homework. This course moves quickly—*don't let yourself fall behind.* If you are unable to attend my usual office hours, you can always set up an appointment or ask questions via email.

Attendance

Attendance is not officially required, and it is not factored into your overall grade. However, It will be very hard for you to succeed in this course if you do not attend class and keep up with the material—poor attendance will likely affect your grade indirectly by impacting your performance on the graded assignments.

Make-up Policy

Make-ups and extensions on assignments will only be granted in the case of severe illness, absences that are required as part of a UT Tyler obligation, or for religious observances. You need to notify me as soon as possible (or at least one week ahead of time in the case of a planned absence) and provide appropriate documentation. Other makeups and extensions are granted only in extreme cases and at the discretion of the instructor.

Collaboration, Plagiarism, and Academic Dishonesty

I encourage you to talk to your classmates when studying and working on homework assignments. When learning abstract mathematics, it is extremely helpful to discuss ideas with others, and it can be easier to discern what one does and does not understand when trying to explain things to others. Therefore, collaboration is an indispensable learning tool. However, any work you submit must represent your own effort. Keep the following guidelines in mind when working on homework:

- The solutions that you turn in to me should be written up by you in your own words. It is fine (and encouraged) to discuss ideas with others, but I want each person to think individually about how to put those ideas down on paper.
- If you have worked with others on a particular problem, say so when you write up your solution. If you got a particular idea from someone else, give them the appropriate credit.

In summary, I encourage you to work on homework together, but I do not want you to write up complete proofs as a group—this should be done individually.

Finally, do not present solutions that you have found in other textbooks or on the internet as your own. Aside from committing plagiarism, doing so defeats the purpose of the homework (which is to learn the material through practice). If I determine that you have submitted work that is not your own, I will prosecute plagiarism and academic dishonesty to the fullest possible extent.

Changes to Syllabus

I reserve the right to make changes to the syllabus during the semester. Any changes to course policies will be announced in class, and an updated version of the syllabus will be posted to Canvas.

Important Dates

- **January 11:** Classes begin.
- **January 18:** Martin Luther King, Jr. holiday. No classes.
- **January 25:** Census date. Last day to change schedule or file for grade replacement.
- **March 1:** Last day to file for Spring 2021 graduation.
- **March 8–12:** Spring break. No classes.
- **March 29:** Last day to withdraw from one or more courses.
- **April 26:** Study day.
- **April 27–30:** Final exam period.

University Policies

Information on University policies concerning the following topics:

- UT Tyler Honor Code
- Students Rights and Responsibilities
- Campus Carry

- UT Tyler Tobacco-Free Policy
- Grade Replacement/Forgiveness and Census Date
- State-Mandated Course Drop Policy
- Student Accessibility and Resources
- Student Absence due to Religious Observance
- Student Absence for University-Sponsored Events and Activities
- Social Security and FERPA Statement
- Emergency Exits and Evacuation
- Student Standards of Academic Conduct
- UT Tyler Resources for Students

can be found at

`http://www.uttyler.edu/academicaffairs/files/syllabuspolicy.pdf`

In addition, the university has instituted the following policies regarding the COVID-19 pandemic:

COVID-19 Information for Classrooms and Laboratories: Students are required to wear face masks covering their nose and mouth, and follow social distancing guidelines, at all times in public settings (including classrooms and laboratories), as specified by Procedures for Fall 2020 Return to Normal Operations. The UT Tyler community of Patriots views adoption of these practices consistent with its Honor Code and a sign of good citizenship and respectful care of fellow classmates, faculty, and staff.

Students who are feeling ill or experiencing symptoms such as sneezing, coughing, or a higher than normal temperature will be excused from class and should stay at home and may join the class remotely. Students who have difficulty adhering to the COVID-19 safety policies for health reasons are also encouraged to join the class remotely. Students needing additional accommodations may contact the Office of Student Accessibility and Resources at University Center 3150, or call (903) 566-7079 or email `saroffice@uttyler.edu`.

Recording of Class Sessions: Class sessions may be recorded by the instructor for use by students enrolled in this course. Recordings that contain personally identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of students enrolled in the course and only for educational purposes. Course recordings should not be shared outside of the course in any form without express permission.