

Lectures: TR 9:30-10:45 in SCI 136.

Professor: David McClendon (2046 ASC, phone x2574 (231-591-2574 off campus), hours MTWR 2-3 or by appointment, email: mcclend2@ferris.edu)

Required Text: *Introduction to Analysis*, by Maxwell Rosenlicht, ISBN 0-486-65038-3.

Highly Recommended Text: *Counterexamples in Analysis*, by Gelbaum and Olmstead, ISBN 0486428753.

Other references: Here are some other books which cover the same material we will be discussing:

- *Introduction to Real Analysis* by R. Bartle and D. Sherbert;
- *Elementary Classical Analysis* by J. Marsden;
- *Principles of Mathematical Analysis* by W. Rudin.

Additionally, there is a text by E. Zakon (*Mathematical Analysis Volume I*) available online at www.trillia.com for \$10.

Web: Course material is posted to Blackboard (FerrisConnect), which can be accessed through MyFSU.

Prerequisites: The only actual mathematical knowledge required is Math 220 and 230 (single-variable calculus). More useful than having taken any particular math course is some familiarity with the language of sets and functions, and some experience doing proofs and interpreting logical statements. As such, the official prerequisites are Math 320 and Math 324.

Course material: There are three main goals in an undergraduate real analysis course:

1. Rigorously derive the theory of elementary calculus (this is centered on making the notion of “limit” precise, but includes proving the Intermediate Value Theorem, Mean Value Theorem, Fundamental Theorem of Calculus, and Taylor’s Theorem among other things).
2. Study the properties of the real numbers (and their generalizations which are referred to as the topological properties of metric spaces)
3. Learn how to write proofs, in particular a certain kind of argument which I call an “ ϵ -proof”.

Learning outcomes: At the end of the semester, it is my hope and expectation that students will be able to:

1. demonstrate a mastery of course vocabulary;
2. prove whether or not a sequence of real numbers converges;
3. prove whether or not a given set in a metric space is open/closed/connected/compact/complete/bounded/etc.;
4. determine, with proof, the value of a limit of a function;
5. prove whether or not a real-valued function is continuous/uniformly continuous/differentiable/integrable/etc.;

6. solve problems and write other proofs related to the concepts described in the first four learning outcomes.

Grading policy: Mathematical correctness of homework: 30%. Writing style of homework: 15%. Two take-home exams: 20% each. Final exam: 10%. Attendance and participation in in-class activities: 5%. Grades will be curved at the end of the semester, but 90% will be no worse than A-, 80% will be no worse than B-, etc.

Attendance policy: I have no formal attendance policy (other than that we'll do some things in class, and if you are repeatedly absent I'll notice). That said, I have taught many math courses, and **nothing** is more correlated with strong performance in my classes than attendance in lectures

Homework: Mathematics cannot be learned solely by watching other people present solutions to problems or by reading examples and proofs in the text. You have to **do** problems, and you have to **write** proofs. This is especially true in Math 430. As such, homework is the most important part of your grade.

Homework assignments will be posted to Blackboard weekly and are due on Thursdays (the first assignment is due Thursday, January 24). Sometimes, you will get to make some choices as to which problems you want to do.

When I grade your homework, I will give you two scores: a “mathematical correctness” score which indicates whether the idea behind what you wrote is correct mathematically, and (if you are asked to write a proof) a “writing style” score which judges, among other things, whether or not you phrase things correctly, whether you properly define variables, whether or not you use symbols correctly, how well your proofs are organized and easy to follow, whether your writing is legible, etc. The way you improve your proof writing style is to make mistakes and learn from them, so I'm looking as much for improvement in writing style as I am for consistently good marks.

It should be noted that it is impossible to totally separate “mathematical correctness” from “writing style”. You might get marked down in both areas for the same mistake.

Doing homework: To learn the subject as well as possible, I recommend the following process: first try the problems by yourself. Second, meet with a small group of classmates and discuss the problems. Third, on your own, write up the solutions to the problems. You may want to meet with me periodically during this process. I also recommend treating proofs like essays - you should work out an outline on paper before starting with any rigorous mathematics. You should expect to spend many hours on each homework assignment and should not expect to do entire homework assignments in one sitting.

It is normal to have no clue how to approach some of the homework problems. Come to my office and ask me how to proceed; some of your best learning will take place in this setting.

Where to turn in homework: There are two ways to turn in homework; it must be turned in by 5:45 PM on the Thursday it is due. You may (1) turn the homework in during class, or (2) put the homework in the slot next to my office door marked

“Math 430” (this is the bottom slot). Graded homework that is unclaimed in class gets put in the same slot.

Take-home exams: There are two take-home exams; one which you will do around spring break and one which is due at the end of the semester. You will have about two weeks to do each exam; you may use your notes and the Rosenlicht and Gelbaum texts, but you may not use other resources (such as other books or the internet). You are not to work with others on the exams. For the most part, the exams consist of proofs. You can ask me questions about the problems, and depending on the question I may or may not give you a hint.

Final exam: The final exam is scheduled for Monday, May 6 at 10 AM (in the usual classroom). This exam is an essay test: I will ask you to write short essays on some of the concepts we learn in class. More information on the final will be provided in advance of the end of the semester.

Supplies: I think it is important to bring colored pencils or pens, not just to Math 63, but every math and science class you take.

Students with disabilities who require reasonable accommodations to fully participate in course activities or meet course requirements should register with the Educational Counseling and Disability Services office (x3057, ecds@ferris.edu). While ECDS will send me a “VISA” outlining the accommodations to make for you, I would appreciate it if you could contact me immediately for assistance with any necessary classroom accommodations.

Academic dishonesty: Papers will be monitored for “magic answers”. Issues with academic dishonesty are taken very seriously, will almost always result in an F for the class, and will be referred to the Office of Student Conduct.