Math 301 – Foundations of Analysis (Fall 2022)

Instructor: Kevin Woods. Call me Kevin! (he/him)

Contacting me: Kevin.Woods@oberlin.edu or 443-695-1681 (mobile). Email is better for involved or less important questions; texting is better for quick, time-sensitive questions.

Lectures: TuTh 9:30-10:45am, King 237. Since this is a long period, I will give a 5 minute break in the middle. Because of this, I might not always finish until 10:50am (but no later); if this would be an issue, let me know.

Google Drive: I will post assignments, daily notes, and other material in the course Google Drive folder. You will need to have regular access to this and to your Oberlin email.

Group work hours: These will take place in **King 203**. Come alone and expect that there will be other students also working on the problem set. Or agree with a group to come! Either I or a dedicated tutor will be there to facilitate group work and give help:
- Tuesdays, 12-1:30pm (with Kevin),
- Tuesdays, 4:30-6:30pm (with Jake Berran),
- Wednesdays, 4:30-6:30pm (with Isaac Dreeben),

Other office hours:
- Thursdays, 11am-noon and Fridays, 2:30-3:20pm, in King 220B.
- If these times don't work, you can make an appointment via email.

Textbook:
- *Understanding Analysis*, by Stephen Abbott, second edition.
- Google will very quickly give you a legitimate, free pdf.
- I plan to cover most of Chapters 1 through 7, and then we will see how much time is left. I'll keep you updated about which sections we're currently covering, using this google doc.

Prerequisites:
- MATH 220 (Discrete Mathematics). The most important thing from Discrete is comfort with mathematical proofs and readiness for a 300-level math class. *How to Think Like a Mathematician*, by Kevin Houston, is my favorite (inexpensive) way to bone up on 220 material, if needed.
- MATH 231 (Multivariable Calculus). We won't use much material from this class, but it helped you gain a deeper understanding of Calculus, and we'll continue to deepen that understanding this semester.
- You should **not** take MATH 327 (Group Theory) at the same time as this class. These are our core 300 level classes, and we want you to be able to focus on them individually.

Learning Goals:
At the end of this course, students will:
- Have knowledge of important mathematical ideas in the Foundations of Analysis, including sequences and series (of real numbers and of functions), the topology of the reals and an introduction to metric spaces, continuity, differentiation, Reimann integration, and the Fundamental Theorem of Calculus.
- Develop a working mastery of examples in the above areas.
- Exhibit further sophistication in thinking abstractly about mathematics.
- Improve your mathematical writing skills.
- Struggle with mathematical concepts, practice persistence, and develop confidence in the face of difficulties.
- Have experience working with other students on mathematics (this one is up to you to work on).

Assignments and Grades:
- Your focus should be on **growth**, but grades are a fact of college life. **If I can see that you are working hard and seeking support, you will pass this class.** If you find yourself preoccupied with grades, consider taking it P/NP.

- Your grade will be based on weekly problem sets. For the most part, you can and should work on them in groups, but (in lieu of take home exams) there will be a problem or two on each problem set that I expect you to work alone on.
- I will drop the lowest two problem sets. Averaging the rest will determine your numerical grade, and this may be curved up to determine your letter grade.
- The best way to learn the concepts in this course is to get your hands dirty! I hope you will work in groups on these, though your written solutions must be in your own words. This is also an opportunity to work on writing careful, clear proofs and explanations. Good mathematics is articulate mathematics! Explain things carefully and in complete sentences. Imagine that another student in the class who hasn't done this problem yet will read your solution: they should be able to understand it without having to ask you questions.
- Problem sets will be due approximately every Thursday at 5pm, submitted via gradescope. (A final problem set will be due at the end of the scheduled final exam slot, Tuesday, December 20, 11am.)
- These problems will be graded strictly for how coherently written they are. In order to focus on your writing, I will eventually require solutions to by typeset in LaTeX, the standard mathematical typesetting language. This will be phased in over the first month, and you'll get help on making the transition.
- Late Work: This is generally **not accepted**, because we have a complicated system of graders, and it is logistically difficult to deal with late work (later that night will generally be ok if you ask in advance and don't make a habit of it). I drop two problem sets because I know that everyone has bad days or weeks, so it is perfectly ok to simply skip that week.
- Honor Code: I encourage you to work together on the problem sets. Your solutions must be in your own words, however. Work on the problem together, and then go back home and write up your solution. In particular, you should never look at someone else's write-up before it is due. And there will generally be a clearly marked problem or two that you have to work alone on.

Support:
- You belong at Oberlin and you belong in this class. People arrive here with different experiences and backgrounds in mathematics. Put in the work, seek out support, and focus on self-improvement, and I promise you that **your mathematical skills will grow**. The rest of us are here to help, including:
- Me! Come by office hours, any time.
- The dedicated tutors! (Jake Brennan and Isaac Dreeben.) They will be holding dedicated drop-in hours to help.
- Your peers! Working with other students helps everyone improve.
- Yourself! Your skills will improve best if you come at this with a growth mindset: embrace the challenge of this class, persist through difficulty, be inspired (not threatened) by the success of others, seek out support.
- If you have a disability of any sort that may affect your performance in this class, please consult with me and with Student Academic Success Programs (Peters 118). I am committed to meeting the needs of all students in my class.
- **I want you to succeed, and I want to help you succeed.** Please let me know how I can help!