

Math 301 – Foundations of Analysis (Fall 2024)

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.

Class: MWF 1:30-2:20pm, King 237.

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.

Problem Sessions: These will take place in **King 203**. Come individually, come in groups, come with questions, come to get started on the homework with other students around. Your choice! Showing up to this is a great way to find other students to collaborate with. Either I or a dedicated tutor will be there to facilitate group work and give help:

- Wednesdays, 4:30-6:30pm (with Rachel Lilley),
- Thursdays, 12:15-2pm (with Kevin),
- Thursdays, 7-9pm (with Izzy Pfaff),

Other office hours:

- Mondays and Fridays, 2:30-4pm, 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](#), or you can buy a paper copy.
- I plan to cover most of Chapters 1 through 7. 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.
- MATH 231 (Multivariable Calculus). We won't use much of its material, 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, Riemann 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.

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** and a **final exam**.
- I will drop the two lowest problem sets. Averaging the rest will determine your numerical grade, and this may be curved up to determine your letter grade. The final exam counts as two problem sets and cannot be dropped.
- 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 Friday at 5pm, submitted via [gradescope](#).
- 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 be 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.
- Some problems will be specifically focused on the writing process. One thing I may do is include anonymized student solutions for you to contemplate; please let me know if you have an issue with me sharing anonymized versions of your solutions.
- Late Work: I will give you until Saturday noon, if you ask in advance and don't make a habit of it. After that, late work is generally not accepted, because it needs to go to the graders. 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. You should never go looking for the solution to a specific problem: for example, **don't read someone else's solution, search the internet or a book, or ask reddit/AI/etc.**
- Half of the final exam will be take-home and should be low stress, and half will be in class, **Monday, December 16, 7-9pm.**

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! (Rachel Lilley and Izzy Pfaff.) See the problem session times above.
 - 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, communicate and advocate for yourself.
- If you have a disability of any sort that may affect your performance in this class, please consult with me and with the [Office for Disability and Access](#). 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!