Math 212- Sequences & Series- Fall 2026

MWF 8:10 – 9:00 am, Hayes 311

Instructor: Noah Aydin (he/him) **Office:** Hayes 319 **Email:** aydinn@kenyon.edu

Office Hours: I will be available in my office for your questions during the following times. If these times do not work for you, please feel free to set up an appointment. Additionally, I encourage you to ask questions via email.

Mon, Tue, Wed, Thu: 1:10-2pm Fri: 2:10-3pm

Textbook: Active Calculus **1st ed** by M. Boelkins, D. Austin, and S. Schlicker. A free textbook. We will cover Chp 8 +Section 6.5 of the textbook. There are also video lessons for the textbook GVSU MTH202 We will also have supplementary reading materials.

Math-Science Skills Center (MSSC): The MSSC offers evening tutoring sessions that are immensely helpful for those students who take advantage of this support. The hours are Sun/Tue/Thu: 7:00 – 10:00 PM in Hayes 109.

About the Course

In this class, we extend the journey of Calculus into the realm of the infinite. While Calculus I and II focused on the processes of change and accumulation, Math 212 asks the question: *What happens when we add things up forever?* We will explore the surprising beauty of infinite sums, and the power of power series to represent transcendental functions. In this course, we investigate:

1. Infinite sums through a study of improper integrals, sequences, and series.
2. Connections between functions and infinite sums through Taylor polynomials, Taylor series, and power series.

We will examine each of these topics from multiple points of view: graphical, numerical, and analytical (i.e., with formulas). We will also include some discussion about how this material relates to open questions in contemporary mathematical research. We will be using the computer software Maple throughout our study. A detailed course schedule is available on the course website.

Note: This class only meets for 7 weeks, hence it is 2 credits

Prerequisites: Math 112 (Calculus II). If you have questions regarding your readiness for this class, please see your professor immediately to discuss your situation.

Course Goals Related to Content

1. Employ precise mathematical notation for limits, sequences & series to communicate complex ideas with clarity and rigor.
2. Define convergence for improper integrals, sequences, and series, and apply these definitions to rigorously demonstrate convergence or divergence of these objects.
3. Analyze limits and strategically select convergence tests to determine convergence of improper integrals, sequences, and series, justifying your reasoning at each step.
4. Demonstrate mastery of the major tests for convergence of series.
5. Approximate transcendental functions using Taylor polynomials, estimate errors, interpret what those error bounds mean.
6. Compute Taylor series for a variety of functions, determine their intervals of convergence, and explain the relationship between finite polynomial approximations and their infinite counterparts.
7. Articulate the connection between power series and functions, and use power series as to solve calculus problems.
8. Apply your knowledge of series to model and analyze real-world phenomena across disciplines-- including economics, biology, physics, and chemistry--demonstrating the ability to transfer mathematical reasoning to other contexts.
9. Engage in sustained collaboration with your peers, inside and outside of class, to dismantle complex problems, interrogate theoretical material, and co-construct mathematical solutions, mirroring the professional culture of the discipline

Other Course Goals

1. **Problem-solving Skills:** You will develop the intuition to recognize appropriate strategies and lines of attack for complex problems. This includes not only executing the necessary technical and algebraic steps, but also cultivating the judgment to select the most effective mathematical tools for a given challenge.
2. **Translating Concepts:** You will gain proficiency in translating verbal descriptions and real-world scenarios into formal mathematical frameworks. This includes identifying key variables, making proper use of notation, and bridging the gap between abstract theory and practical application.

3. **Mathematical Writing:** You will cultivate the ability to present solutions with clarity and rigor. Effective write-ups require balancing multi-step calculations with written explanations that interpret results. Strive to achieve an appropriate balance between narrative text and mathematical notation--a skill central to mathematical communication at every level.
4. **Visualization Skills:** You will enhance your ability to represent mathematical ideas through diagrams, tables, and graphs. By constructing these visual representations, you will organize your thinking and build mental models that lead to deeper conceptual understanding and long-term retention.
5. **Computational Literacy with Maple:** You will learn to use the computer algebra system Maple as a **learning assistant** — a tool to carry out complex computations and visualize abstract concepts that would be too intricate to explore by hand. The goal is to use technology to deepen understanding, not to replace the thinking that produces it.
6. **Stamina and Productive struggle:** You will develop the stamina to work through challenging problems where the path forward is not immediately clear. In this course, we value the **process of discovery** over the final answer. Embracing productive struggle-- trying, failing, and trying again--is not a sign of weakness; it is the primary mechanism through which authentic mathematical mastery is built.

Structure of the Course: Flipped Classroom and Daily Quizzes

This course uses a **flipped classroom model** to prioritize collaborative problem-solving during class time, so you aren't tackling the hardest problems alone. Before each class, you will complete assigned textbook readings and watch short video lessons, freeing our time together for high-level problem solving, presentations, and inquiry with peer and professor support.

- **Before Class:** Read assigned textbook sections and watch short supplementary video lessons. Reading math requires active effort—stop frequently, write out steps on paper, and re-read subtle points.
- **Outside Expectations:** Class cannot cover every detail; you are expected to work through details independently, some of which will be included in homework.

Daily Quizzes & Participation Every class begins with a short quiz on assigned readings and videos. Daily quizzes and class participation make up a significant portion of your course grade.

- **Tech Requirement:** Many quizzes are hosted on Moodle, so **bring a laptop to every class**.
- **Quiz Policy:** Weight of each quiz is a very small and multiple low scores will be dropped. **No make-up quizzes** are allowed.

Assignments and Exams

- **Homework:** Assigned and collected approximately twice per week. You may need to revisit readings or videos while working through problems.
- **Assessments:** One project, one 1-hour exam, and one 3-hour final exam.

Software: We will be using the computer algebra system Maple for computations and for visualization. You will need to install Maple onto your own personal computer. The software is free for all Kenyon students. See the instructions for downloading Maple on the Moodle site for our course.

Grading and Evaluation Criteria:

Final grades will be determined based on the performance in the following components.

Component	Percentage
Daily Quizzes	20
Written Homework	15
Midterm Exam	15
Project	10
Participation *(includes attendance & in-class presentations)*	10
Final Exam	30

Exam Dates:

Midterm: Wed, Sep 23 (in class)
Cumulative Final: Sunday, October 18 (1:30 – 4:30pm)

For exams, a make-up can only be granted with an official notice from one of the deans (either the dean of academics or the dean of students).

Written Homework

Homework is one of the most important parts of this course — expect approximately two "gifts" per week. These exercises serve three purposes: introducing new concepts before class, reinforcing material covered in class, and challenging you with deeper problem-solving. Some assignments will require **Maple**. Assignments are graded on neatness, completeness, and

correctness. Work must be legible, with problem numbers and final answers clearly indicated. That said, I care more about your *reasoning* than your final answer--an answer without explanation earns little credit. Solutions must be written in complete sentences, even when the work is purely computational. Remember: *equal signs are verbs* — equations should read as coherent sentences. Floating mathematical expressions without context are not acceptable.
Collaboration: Group work is encouraged, but all write-ups must be completed **individually and independently** unless told otherwise. Submitting work copied from a classmate--even after collaborative discussion — is plagiarism. Review the math department's policy on healthy collaboration.

Project: There will be one project assigned in this course. The project will involve working in pairs through a set of exercises that serve to guide you through a mathematical analysis, and afterwards you will give a presentation synthesizing your results. When working in pairs, both students must be involved in all aspects of the work; that is, each cannot perform an isolated half of the project. Be sure to follow the instructions provided with the project.

Course Policies & Expectations

Late Policy for Homework

Homework is due at the **START** of class on the assigned due date, unless specified otherwise. Each student will be allowed **one 24-hour extension** on a homework assignment. After this one extension, late homework will not be accepted. Finally, all homework will be submitted electronically through Moodle in the form of a *single PDF*. You can use a scanning app like CamScanner to produce pdf. The submitted file has to be a single pdf file.

Attendance & Tardiness Policies: Regular attendance and active participation are essential in this course--not just encouraged, but built into your grade. Every *unexcused absence* reduces your participation grade by 10%, and 2 instances of tardiness count as one absence. Students who need to miss class should contact me in advance. Per department policy, more than **3 absences** (20% of class meetings) will result in expulsion from the course. This limit exists because the cumulative nature of our work makes it genuinely difficult to recover from significant gaps — it is a boundary set to protect your learning, not a punitive measure.
Self-Reflection & Participation: Because participation takes many forms not always visible to me, you will complete a reflection assignment at mid-term and at the end of the semester, assigning yourself a participation grade and justifying it. Your self-assessment will be factored into your final participation grade. The best way to excel here is simple: come prepared, engage fully, and complete readings on time. The following behaviors will lower your participation grade: Tardiness or early exits, looking up answers online, and inappropriate use of electronic devices during class

Academic Honesty and Generative AI Policy: The rules set forth in the 2026-27 Course Catalog apply to all aspects of this course. In general, any work submitted for credit must result directly from your own understanding, thoughts, and ideas. Presenting the work of others as your own is strictly prohibited. Follow the guidelines given in this document in general and mathematics department's guidelines for written homework in particular as well as guidelines for using AI. Using chatGPT or other generative AI tools (e.g. Gemini, Claude, etc.) are prohibited for most of the assignments (including written homework) and exams in this course. Limited use of AI will be allowed for Maple syntax and exam preparation. See this document for more details on allowable AI use in this course. If you have any questions, please ask your professor for clarification.

Accessibility and Accommodations: Students who anticipate they may need accommodations in this course because of the impact of a learning, physical, or psychological disability are encouraged to meet with me privately early in the semester to discuss their concerns. In addition, students must contact Student Accessibility and Support Services (SASS) (740-427-5453 or sass@kenyon.edu), as soon as possible, to verify their eligibility for reasonable academic accommodations. Though I am happy to help you in any way I can, I cannot make any special accommodations without proper authorization from the SASS staff. Except in extraordinary circumstances (and at the very start of the course), accommodations must be certified and discussed with me at least one week before they are to take effect.

Names and Pronouns: In this class, we will respect one another's self-disclosed name, pronoun and identity. Students are encouraged to use gender-neutral language if they are not sure of someone's pronouns. For more information on Kenyon's commitment to diversity and non-discrimination, please refer to the Office for Civil Rights and/or the Office of Diversity, Equity, and Inclusion.

Non-Discrimination, Civil Rights and Title IX Compliance

Kenyon College prohibits discrimination in its educational programs, activities, employment, and admissions on the basis of race, color, national origin, sex, gender identity, sexual orientation, disability, age, religion, veteran status, or any other characteristic protected by law. As your professor, I am deeply invested in your well-being and am happy to help with concerns beyond coursework. However, please know that all faculty are Mandated Reporters — I am required to report any incidents of harassment, discrimination, sexual misconduct, or interpersonal violence to the Civil Rights/Title IX coordinator and cannot keep such information confidential. For confidential support, please contact the Health and Counseling Center**,** College chaplains**,** or New Directions Domestic Abuse Shelter & Rape Crisis Center. For further information, please refer to the following Kenyon College policies: Discrimination, Sexual Misconduct & Harassment: Title IX, VAWA, Title VII. Civil Rights Policy ADA & Section 504 Student Grievance Procedures

How to Study for this Class

- Regular work and genuine engagement in the material are the most important aspects of deep learning in any math class.
- Read the assigned sections from textbook and watch the accompanying video(s), when there is one available, BEFORE the class. When the video says "pause and do some computation, then resume", you should do so. You may not understand everything in the first reading but that's OK. Do your best. Take notes to ask questions in class.
- Come to the class and actively participate in problem solving other class activities and discussions. Do not hesitate to ask and answer questions, or contribute to class discussions in other ways. Daily quizzes and presentation of problems in class are significant part of your grade.
- Start doing homework problems early. Do not wait until the last minute. Seek help in a timely manner.
- Do homework problems regularly. Do a few problems every day instead of trying to do everything the last night.
- If you have any questions, come see Prof. Aydin during the regular office hours (no appointment needed) or make an appointment. See Prof Aydin's weekly schedule to find a mutually convenient time. Also make use of help from the MSSC.
- You are welcome to chat with Professor Aydin for matters outside the course content as well.
- Form study groups. Research shows studying in groups is really beneficial. BUT make sure that you write your own solutions independently at the end. Follow Math Dept's guidelines on healthy collaboration.

Classroom Etiquette and Expectation **Class Norms**

1. Be on time to class and refrain from leaving and re-entering the classroom during a lesson. Be respectful and don't disrupt class; use the restroom in between your classes.
2. Do not use computers or cell phones in class, unless, we are using the computer in the lesson. Late arrivals, key tapping, and flashing computer screens can be very distracting to others. Please be respectful of those around you.
3. Remember that there are many students in the class, and different students have different needs. For example, some students may find the first week or two slow because they have seen improper integrals and sequences in earlier courses. We tried to design a course that meets the needs of the class as a whole. Please respect the differences of others. If you find you need additional challenge or academic support, see your professor.
4. We want to engage as many people in the class as possible. To this end, it is not appropriate for only few people to ask/answer most of the questions. If you frequently answer questions, please do not be offended if I solicit a response from somebody else. Additionally, please do not dominate the class with your own questions. Be mindful of others.

Supplementary Materials and Copyright: All assignments and supplementary materials are available on a GoogleDrive folder and Moodle. Course materials created by the faculty instructor are protected by copyright law. You may share these materials with other students enrolled in the course, but you may not reproduce, distribute, or display course materials for anyone outside of the class without explicit written consent.

About Your Professor: I began my academic journey as a first-generation college student; neither of my parents attended high school, and one had no formal education at all. Because of this, I am a firm believer in the "school of life," growth mindset, the power of a positive attitude and consistent work ethic. My primary research area is algebraic coding theory in which I run an active undergraduate research program. I have co-authored dozens of papers with Kenyon students published in top research journals. My broader scholarly interests range from cryptography and combinatorics to the history of mathematics and the relationship between religion and science. Outside academia, I am an avid soccer (football) fan, a meteorology enthusiast, and a global citizen who has lived in four different continents. Whether you want to work through sequences and series, discuss undergraduate research, or chat about soccer, weather, climate change, or world affairs, my door is always open. Please drop by office hours! (or make an appointment for another time)

Book Recommendation on Learning and Study Habits

The New Science of Learning: How to Learn in Harmony With Your Brain, by T. Doyle, and T. Zakrajsek
http://www.goodreads.com/book/show/17783567-the-new-science-of-learning

The 5 Elements of Effective Thinking, by E. B. Burger, and M. Starbird
http://www.goodreads.com/book/show/14891980-the-5-elements-of-effective-thinking#other_reviews