Syllabus
Fall Semester, 2025
MATH 3243, Advanced Calculus
MW, 10:30–11:45 AM
Technology-Enhanced Learning Center, Room 1114

Text: *Understanding Analysis*, Second Edition, by Stephen Abbott, Undergraduate Texts in Mathematics, Springer-Verlag, 2015. You can purchase this text as a pdf for $34.99 at

https://link.springer.com/book/10.1007/978-1-4939-2712-8.

Instructor: Dr. Mark Faucette

Office: Technology-Enhanced Learning Center, Room 2247

Phone: My contact phone number is 470-729-1129. This is my Google voice phone number. It will ring my campus phone and my cell phone.

E-Mail: My e-mail address is faucette@westga.edu.

The Web: My web page is at URL http://mfaucette.dyndns.org. The full course syllabus is located on my web site and can be downloaded as a pdf file. It is the student's responsibility to download and/or to print the syllabus and to follow it.

Office Hours: My office hours are

- MW: 8:00–9:00 AM
- TR: 1:30–2:30 PM
- F: 10:00–11:00 AM

Other times are available by appointment.

I do not hold office hours during final exam week.

Common Language for Course Syllabi: Students, please carefully review the following information at the link

http://www.westga.edu/UWGSyllabusPolicies/.

It contains important material pertaining to your rights and responsibilities in this class. Because these statements are updated as federal, state, university, and accreditation standards change, you should review the information each semester.

Grading Policy

Homework (500 points) Homework is usually due on Mondays. Be sure to show your work and explain how you got your answer. Correct but incomplete answers will only receive partial credit. Part of the beauty of mathematics is in the elegance of its proofs, and one goal of this course is for you to learn to write mathematics excellently.

Cooperation on homework is permitted (and encouraged), but if you work together, do not take any paper away with you—in other words, you can share your thoughts (say on a whiteboard), but you have to walk away with only your understanding. In particular, you must write the solution up on your own.

In class "Quick Response" Activities (50 points) On occasion throughout the semester, you will be given short (5-minute) in-class quick response quizzes. These will be easy and are simply to encourage you to keep up with the class and reward your attention.

Tests (200 points) There will be two tests, each counting one hundred points.

Final Examination (250 points) There will be one comprehensive final examination counting two hundred fifty points.

At the end of the semester, the following grading scale will be used:

- 1000 points is the total number of points possible.
- A total of 900–1000 points earns an A.
- A total of 800–899 points earns a B.
- A total of 700–799 points earns a C.
- A total of 600–699 points earns a D.
- A total below 600 points earns an F.

Expectations

Goals: I see three main goals for us:

(i) To continue to learn how to write extended, rigorous mathematical proofs.

(ii) To understand why an intuitive understanding of calculus (learned in MATH 1634, 2644, and 2654) is insufficient as a foundation for building more complicated and powerful mathematical tools.

(iii) To enjoy the payoff of analytical rigor and abstraction by studying some newly accessible topics.

Weekly Assignments: I will assign a problem set each week, which is due on Mondays. **You are allowed and encouraged to work together**, share ideas, and get help from me.

PLEASE DO NOT USE ANY SOURCES OTHER THAN YOUR TEXT, ME, AND EACH OTHER. Do not consult peers outside of our class, no other professors, and no internet! The idea is to wrestle with the ideas of the course using just the resources given to you in class and in your book.

Tests: There will be two tests administered on Wednesday, September 24, and Wednesday, October 29.

Final Exam: There will be a final examination administered on Wednesday December 10, from 12:00 PM to 2:00 PM in room 1114 of the Technology-Enhanced Learning Center.

Grades: Your grade will be computed from the following rubric:

- 50% Weekly assignments
- 10% Test #1
- 10% Test #2
- 5% In-class "Quick Response" Activities
- 25% Final examination

MATH 3243 Lecture Schedule

Wednesday, August 13	Some Preliminaries
Monday, August 18	The Axiom of Completeness
Wednesday, August 20	Consequences of Completeness
Monday, August 25	Cantor's Theorem
Wednesday, August 27	The Limit of a Sequence
Monday, September 1	Labor Day Holiday
Wednesday, September 3	The Algebraic and Order Limit Theorems
Monday, September 8	The Monotone Convergence Theorem and a First Look at Infinite Series
Wednesday, September 10	Subsequences and the Bolzano-Weierstrass Theorem
Monday, September 15	The Cauchy Criterion
Wednesday, September 17	Properties of Infinite Series
Monday, September 22	Open and Closed Sets
Wednesday, September 24	Test #1
Monday, September 29	Compact Sets
Wednesday, October 1	Functional Limits
Monday, October 6	Continuous Functions
Wednesday, October 8	Continuous Functions on Compact Sets
Monday, October 13	The Intermediate Value Theorem
Wednesday, October 15	Derivatives and the Intermediate Value Property
Monday, October 20	The Mean Value Theorem
Wednesday, October 22	A Continuous Nowhere-Differentiable Function
Monday, October 27	Uniform Convergence of a Sequence of Functions
Wednesday, October 29	Test #2
Monday, November 3	Uniform Convergence and Differentiation
Wednesday, November 5	Series of Functions
Monday, November 10	Power Series
Wednesday, November 12	Taylor Series
Monday, November 17	The Definition of the Riemann Integral
Wednesday, November 19	Integrating Functions with Discontinuities
Monday, November 24	Thanksgiving Recess
Wednesday, November 26	Thanksgiving Recess
Monday, December 1	Properties of the Integral
Wednesday, December 3	The Fundamental Theorem of Calculus

Homework Policies

I know each of you has taken MATH 3003 so you have been given excellent instruction on how to write mathematical proofs.

What I'd like to tell you here is how your proofs should be presented when you submit them to me.

1. For your homework, please use standard 8 1/2 inch by 11 inch lined notebook paper. I don't care if it has holes or not, but I want it to be the correct size and I want it lined.

2. I do not want any "ragged edges." Do not tear paper out of a spiral bound notebook to hand in.

3. Write only on the front side of the paper. I do not want to have to flip your papers continually from front to back to front to back to grade them.

4. In the upper right corner of the first page should be your name, "MATH 3243," and the homework assignment number.

5. Each problem should begin at the top of a new piece of paper on the left side of the page. If the problem is divided into parts, such as (a), (b), (c), etc., this doesn't mean each of these should start on a new page. However, I'd like each problem to begin at the top of a new piece of paper. If a problem continues onto a second page, that's fine, but I want the start of each problem at the top of a new page.

6. For each problem the first thing you should write down is "Exercise" followed by the exercise number you're working on. Then you should write the problem as stated in the book. This tells me what you're doing.

7. You should next begin your proof with the word "Proof" underlined with a colon following it. This tells me you are starting your proof. If the problem is not a proof but a computation, example, counterexample, etc., simply write "Solution" underlined with a colon following it. Then put your solution.

8. Every mathematical proof should be written in sentences and paragraphs. A mathematical proof is equivalent to an English essay. It should be written that way. This means you probably should write a first draft of each proof before writing a final draft to turn in. I want your proofs to be aesthetically pleasing, as well as mathematically correct.

9. Make sure the logic in your proofs is sound.

10. When you finish your proof, put something to indicate your proof is complete. You can use □ or ■ or // or QED or something similar as long as you're consistent.

11. Put your solutions and proofs in the order they are in the text book. I don't want to have to search through your homework to find where you've put each problem.

12. Each of your assignments should be stapled together. This means I do not want them paper-clipped or taped or "crinkle-cornered".

13. Your homework is due on the date given on the Assignments page for your course on my web site.

    There is a link to this page in the section of my web site dedicated to your course.

    This is also where your homework assignments will be posted each week.

    I do not take any work late.

14. You are permitted (and, in fact, encouraged) to work together on the solutions to the weekly homework assignments (with the exception of the pledged problem sets, where you may not work together). However, the work must be your own. You can share ideas and understanding, not proofs or solutions.

15. I am well aware that both the text book and the solution manual are available online free as pdfs. I have both of them. If you choose to copy your homework solutions from a published solution manual, I will catch you and I will fail you in the course. Trust me: I can tell the difference between a proof you can write and a proof a text book author writes. And if you copy from a solution manual, you had best hope it's not the one I have. If so, I'll have sufficient evidence to have you brought up on disciplinary charges with the Dean of Students.

Academic Honesty
Prohibited Conduct[1]

The penalty for violating this policy is failure in the course.

General standard of conduct: No student shall knowingly perform, attempt to perform, or assist another in performing any act of dishonesty on academic work to be submitted for academic credit or advancement. The term "knowingly," as used in the preceding sentence, means that the student knows that the academic work involved will be submitted for academic advancement. "Knowingly" does not mean that the student must have known that the particular act was a violation of the University's academic honesty policy. A student does not have to intend to violate the honesty policy to be found in violation. For example, plagiarism, intended or unintended, is a violation of this policy.

Examples of Academic Dishonesty: The following acts by a student are examples of academically dishonest behavior:

I. Plagiarism - Submission for academic advancement the words, ideas, opinions or theories of another that are not common knowledge, without appropriate attribution to that other person. Plagiarism includes, but is not limited to, the following acts when performed without appropriate attribution:
   A. Directly quoting all or part of another person's written or spoken words without quotation marks, as appropriate to the discipline;
   B. Paraphrasing all or part of another person's written or spoken words without notes or documentation within the body of the work;
   C. Presenting an idea, theory or formula originated by another person as the original work of the person submitting that work;
   D. Repeating information, such as statistics or demographics, which is not common knowledge and which was originally compiled by another person;
   E. Purchasing (or receiving in any other manner) a term paper or other assignment that is the work of another person and submitting that term paper or other assignment as the student's own work.

II. Unauthorized assistance - Giving or receiving assistance in connection with any examination or other academic work that has not been authorized by a faculty member. During examinations, quizzes, lab work, and similar activity, students are to assume that any assistance (such as books, notes, calculators, and conversations with others) is unauthorized unless it has been specifically authorized by a faculty member. Examples of prohibited behavior include, but are not limited to, the following when not authorized:
   A. Copying, or allowing another to copy, answers to an examination;
   B. Transmitting or receiving, during an examination, information that is within the scope of the material to be covered by that examination (including transmission orally, in writing, by sign, electronic signal, or other manner);
   C. Giving or receiving answers to an examination scheduled for a later time;

[1]The content of this page is taken from the document *Academic Honesty Policy (A Culture of Honesty),* (§5, The University of Georgia.

D. Completing for another, or allowing another to complete for you, all or part of an assignment (such as a paper, exercise, homework assignment, presentation, report, computer application, laboratory experiment, or computation);

E. Submitting a group assignment, or allowing that assignment to be submitted, representing that the project is the work of all of the members of the group when less than all of the group members assisted substantially in its preparation;

F. Unauthorized use of a programmable calculator or other electronic device.

III. Lying/Tampering/Bribery - Bribery or giving any false information in connection with the performance of any academic work or in connection with any proceeding under this policy. This includes, but is not limited to:

A. Giving false reasons (in advance or after the fact) for failure to complete academic work. This includes, for example, giving false excuses to the Faculty Member or to any University official for failure to attend an exam or to complete academic work;

B. Falsifying the results of any laboratory or experimental work or fabricating any data or information;

C. Altering any academic work after it has been submitted, unless such alterations are part of an assignment (such as a request of an instructor to revise the academic work);

D. Altering grade, lab, or attendance records. This includes, for example, the forgery of University forms for registration in or withdrawal from a course;

E. Damaging computer equipment (including disks) or laboratory equipment in order to alter or prevent the evaluation of academic work, unauthorized use of another's computer password, disrupting the content or accessibility of an Internet site, or impersonating another to obtain computer resources;

F. Giving false information or testimony in connection with any investigation or hearing under this policy;

G. Submitting for academic advancement an item of academic work that has previously been submitted (even when submitted previously by that student) for academic advancement, unless done pursuant to authorization from the Faculty Member supervising the work or containing fair attribution to the original work.

IV. Theft - Stealing, taking or procuring in any other unauthorized manner (such as by physical removal from a professor's office or unauthorized inspection of computerized material) information related to any academic work (such as exams, grade records, forms used in grading, books, papers, computer equipment and data, and laboratory materials and data).

V. Other - Failure by a student to comply with a duty imposed under this policy. However, no penalty is imposed under this policy for failure to report an act of academic dishonesty by another or failure to testify in an academic honesty proceeding concerning another.

Any behavior that constitutes academic dishonesty is prohibited even if it is not specifically listed in the above list of examples.