Math 3150: Analysis I, Spring 2011

Instructor:	Dr. Erin Terwilleger Mullen
Office Hours:	Monday 1-2, Tuesday 3-4, Wednesday 2-3, or by appointment
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Lectures: TTh 11:00-12:15 pm, MSB 211

Text: An Introduction to Analysis, Fourth Edition by Wade; Pearson Prentice Hall, 2010. We expect to cover most of Chapters 1-6.

Goals: The main goal for the semester is to develop, learn, and understand the basic theory of real analysis. We will revisit some ideas from calculus, laying down a more rigorous mathematical foundation of these concepts and learning the proofs they didn't teach you in calculus. You will also learn some new ideas and proof techniques. You should not only be able to do proofs similar to ones seen in the homework, but you should have the ability to articulate the ideas presented in the course in a clear and coherent manner as well. You should also be able to apply the theory in new and imaginative ways.

Another important goal of the course if to help you improve your ability to read and write mathematics. To help accomplish this, the class will be run in a more interactive way than the usual lecture/homework/exam routine. You will be reading the sections in the book yourself before we talk about the material in class. In fact, I may not cover everything that you need to know in class. Instead, we will try to utilize the time effectively on the more difficult concepts and proofs. Also we will take some class time to work in small groups and discuss and present easy to medium problems that you have prepared in advance. I think you will find it very beneficial to discuss the mathematics in small groups with an expert (that's me!) nearby to help.

Rules and Expectations: I expect you to come to class on time and participate. As part of this expectation, I do not allow cellpone, MP3 player or computer use. If you must miss a class, I expect you to find out what happened, either from myself or one of your classmates. You are responsible for everything that goes on in class.

Even with the in-class component, I expect you to do much of your learning outside of the classroom. You should expect to spend 6-10 hours a week studying and working on mathematics outside of class. Mathematics, like most subjects, is learned by doing it. I expect you to come to class and participate actively in class discussions and group work.

Finally, you are responsible for reading, understanding, and following all policies in this syllabus. However, I reserve the right to make any changes to the syllabus that I deem necessary as the class goes on.

Grading: The grading scale will follow the standard scale for +/− grading. If at the end of the semester, the class average is significantly below 75%, the grading scale will be adjusted accordingly. Your grade will be determined as follows.

Reading Assignments	5%
Warm-up Problems	10%
Homework	15%
Exam 1	20%
Exam 2	20%
Final exam	30%

Reading Assignments: Each week you will have reading assignments from the textbook that will be due on Mondays and Wednesdays at 3 pm. There will be a folder outside my door to collect them, or you can submit electronically if you are not on campus those days. While reading, I encourage you to write down in a notebook all the new concepts, definitions, and theorems you find in the reading. I expect you to also write down your own questions about the reading and what you didn't understand. Then in the first part of the class, I will concentrate on the topics that many students found confusing and go over the proofs of important theorems. For each reading assignment, you will receive a grade out of 3 points based on your answers. You do not necessarily need to get everything exactly correct to get full credit, but it should be clear that you read the material and made an effort to answer the questions.

Warm-up Problems: Each week when you get a reading assignment. you will be assigned some "warm-up" problems from that section which are in the easy to medium range. These exercises will be listed on the course homepage for reference. You should have them prepared for the beginning of the next class period after the reading assignment is due. Then in the second part of class, you will get together in groups of 2–3 to compare/discuss your answers and work on the problems you could not get alone. I will be there to guide and help you. I may also have groups present their solution to a problem on the board, or we may discuss a problem as a whole if everyone is struggling with the same problem. At the end of class, you will turn in the work that you have completed. Your grade on this portion of the homework will be out of 3 points and largely based on completion and effort (but nonsense doesn't count). If you do not have the problems prepared before class, please still come to class. You may get some problems done in class and will certainly learn more.

Homework: On Thursdays, you will be assigned some harder problems to work on from the material we have covered that week. These will generally be due on the following Thursday and graded carefully. You may work with others on these problems in order to get ideas and/or get help from me in my office hours. However, **you must write your own proofs and solutions and not just copy someone else's work!**

Exams: There will be two in-class exams **tentatively** scheduled

Exam 1: Wednesday, February 24
Exam 2: Wednesday, April 7

The final exam **tentatively** scheduled for Tuesday, May 3 from 10:30-12:30 pm will be

comprehensive.

Makeup Policy: Late work will not be accepted. If a true emergency arises, and you must miss an exam, you are responsible for notifying me **beforehand**, supplying the proper documentation, and scheduling a makeup exam. I reserve the right to refuse a makeup exam.

On February 2, 2009, the University Senate passed a motion about religious observances which stipulated that"Students anticipating such a conflict should inform their instructor in writing within the first three weeks of the semester, and prior to the anticipated absence, and should take the initiative to work out with the instructor a schedule for making up missed work. For conflicts with final examinations, students should, as usual, contact the Office of Student Services and Advocacy (formerly the Dean of Students Office).

Calculator Policy: Calculators are neither needed nor allowed.

Course Policy on Academic Integrity: A fundamental tenet of all educational institutions is academic honesty; academic work depends upon respect for and acknowledgment of the work and ideas of others. Misrepresenting someone else's work as one's own is a serious offense in any academic setting and it will not be condoned.

Academic misconduct includes, but is not limited to, providing or receiving assistance in a manner not authorized by the instructor in the creation of work to be submitted for academic evaluation (e.g. papers, projects, examinations and assessments - whether online or in class); presenting, as one's own, the ideas, words or calculations of another for academic evaluation; doing unauthorized academic work for which another person will receive credit or be evaluated; using unauthorized aids in preparing work for evaluation (e.g. unauthorized formula sheets, unauthorized calculators, unauthorized programs or formulas loaded into your calculator, etc.); and presenting the same or substantially the same papers or projects in two or more courses without the explicit permission of the instructors involved.

A student who knowingly assists another student in committing an act of academic misconduct shall be equally accountable for the violation, and shall be subject to the sanctions and other remedies described in The Student Code.

Sanctions shall include, but are not limited to, a letter sent to the Office of Student Services and Advocacy of the University; a grade of 0 on the assignment, quiz or exam; a grade of F for the course.

Final Exam Policy: The following is a message from the Office of Student Services and Advocacy of the University: "Attention Students. Final exam week for Spring 2009 takes place from Monday, May 2, through Saturday, May 7. Students are required to be available for their exam during that time. Students must visit the Office of Student Services and Advocacy if they cannot make their exam. They will give the student his or her instructions thereafter. Please note: vacations, previously purchased tickets or reservations, weddings (unless part of the wedding party), and other large or small scale social events, are not viable excuses for missing a final exam. Please contact the Office of Student Services and Advocacy office with any questions. Thank you in advance for your cooperation."

Topics:

Chapter 1: The Real Number System

1.1 Ordered field axioms
1.2 Well-Ordering Principle
1.3 Completeness Axiom
1.4 Functions, countability, and the algebra of sets

Chapter 2: Sequences in $\mathbb{R}$

2.1 Limits of sequences
2.2 Limit theorems
2.3 Bolzano-Weierstrass Theorem
2.4 Cauchy Sequences
2.5 Limits supremum and infimum

Chapter 3: Continuity on $\mathbb{R}$

3.1 Two-sided limits
3.2 One-sided limits and limits at infinity
3.3 Continuity
3.4 Uniform continuity

Chapter 4: Differentiability on $\mathbb{R}$

4.1 The derivative
4.2 Differentiability Theorems
4.3 Mean Value Theorem
4.4 Monotone functions and Inverse Function Theorem

Chapter 5: Integrability on $\mathbb{R}$

5.1 Riemann integral
5.2 Riemann sums
5.3 Fundamental Theorem of Calculus
5.4 Improper Riemann integration

Chapter 6: Infinite Series of Real Numbers

6.1 Introduction
6.2 Series with nonnegative terms
6.3 Absolute convergence
6.4 Alternating series

Chapter 7: Infinite Series of Functions

7.1 Uniform convergence of sequences