

Math 4320 Syllabus
Analysis I
Spring 2020 Sul Ross State University

Secs. 001, MC1:	Mon, Wed: 6:00-7:15p in ACR 206
Instructor:	Dr. Kris Jorgenson
Office:	ACR 109D
E-mail:	kjorgenson@sulross.edu
Office Hours:	M, W: 10-11a, 2:30–3:30p; Tu, Th: 10-11a, 3:30–4:30p; Fri: 10a-12p; also available by appointment

Course Description: The prerequisite is Calculus III (Math 3415), or consent of the instructor. This course will take on the traditional analysis topics: properties of the real numbers, sequences and series of real expressions, and rigorous proof of the fundamental elements of calculus, such as limits, continuity, and differentiability of functions of a single real variable by following a historical perspective. We will examine the investigations into the assumptions of calculus that amounted to a thorough reconstruction of calculus that warranted a new name: Analysis. We will study the questions and challenges met by the great mathematicians of history such as Archimedes, Euler, Cauchy, and others not only through rigorous proof-writing, but also through exploration using modern technology.

Student Learning Objectives Successful students will demonstrate correct understanding and knowledge of the topics including but not limited to those of the preceding paragraph. Students will apply concepts and problem-solving methods to different problem-solving situations. Students will demonstrate correct knowledge of the difference between numbers that are in exact form (perhaps in the context of another mathematical object such as a function or algebraic expression) and numbers that are approximate and will be able to report numbers in exact form and with a correct approximation when required. Students will express their solutions clearly in writing using complete sentences.

This course is supportive of the
Program Learning Outcomes for the Bachelor of Science degree in Mathematics:

The graduating student will demonstrate that he/she is able to:

- Apply knowledge of basic mathematics principles;
- Identify and provide valid proofs or solutions for theorems and problems;
- Recognize and dispute invalid mathematical statements using counter-examples.

Marketable Skills

Marketable Skill 1: Logical and Analytical Skills

Marketable Skill 2: Problem-Solving Using Analytic and Algebraic Methods

Marketable Skill 3: Use of Technology in Problem-Solving and Presentation

Marketable Skill 4: Communication and Pedagogical Skills

Required Textbook: A Radical Approach to Real Analysis, by David M. Bressoud, 2nd Edition, 2007 ISBN: 978-0-88385-747-2 published and distributed by the Mathematical Association of America (MAA).

Additional Resource, not required: Introduction to Analysis by Maxwell Rosenlicht, 1968 by Dover Publications, Inc. ISBN-13: 978-0486650388, ISBN-10: 0486650383

Other Required Elements:

Class Materials: Students are expected to be prepared in every class with pencils and paper to take notes of lecture content and examples, and you are required to be involved in in-class assignments and discussion. This will be part of your grade.

Blackboard: Also you are required to have access to Blackboard and have an e-mail address that you check regularly be your e-address registered in Bb since I may need to contact you outside of class with important information.

Grading and Assignments: The assignments discussed below will help students achieve all of the Learning Objectives mentioned previously through active learning and assessment. Your total grade will break down as follows:

Homework grade (worth 20%), **3 tests** (worth 70%), and **attendance and class participation** (10%). **Optional Individual Project Problem** to supplant 10% of the test average.

The **tests** will be based on assigned homework and in-class quizzes. The HW grade will include homework handed in and in-class quizzes. In-class presentations and a notebook grade may also be part of the homework grade. Test 3 will cover new material but also will be comprehensive by covering material from the 1st two tests. The tests will be given in class on the following dates:

Test 1	Thu, Feb. 20
Test 2	Thu, April 2
Test 3	Mon, May 4: 6-8p

Late Work, Rescheduled Quizzes/Tests To take an in-class quiz or test for full credit at a time other than the scheduled time, you must notify me of this absence ON OR BEFORE THE DAY MISSED, and satisfy one of two requirements: either (1) supply a written medical excuse signed by a medical professional for the day of the absence, or (2) your excuse is for a university activity, in which case you must notify me of this authorized absence in writing with your name, the name of your organization and the date(s) of your absence, and your name must appear on a published explained absence list that I am provided (or this is verified by a faculty sponsor). Also, you and I must set up a time for you to make up the quiz or test within a reasonable time period (not more than 2-3 days) before or after the time of the missed grade. Usually I will let you make up a grade according to the above conditions if it is due to another one-time occurrence, such as the care of someone else in your family or a friend, or for a work-related excuse as long as you can document your absence and you let me know BY THE DAY OF THE ABSENCE AT THE LATEST.

Attendance I will be taking attendance as university policy precludes you from missing 3 weeks or more of classes for anything other than authorized university activities. To excuse an absence for a university activity, in addition to letting me know of the absence by the day of the absence (as explained previously) you must also spend at least 60 minutes outside of class on this course with me. Also I will allow you to excuse a test day for a documented medical absence as long as you also make up the test. If you have 3 weeks or more of unexcused

absences (6 classes for a TuTh section), I reserve the right to drop you from this class with a grade of 'F', which is university policy.

Good Advice Concentrate on learning the material of the course rather than worrying about your grade. Your time is best spent concentrating on the material to be learned in the impending assignments, asking questions, and devoting yourself to activities that will help you learn the material and do better in the course. I will worry about the details of your grade since you doing so does not help you earn a higher grade. But learning the material and doing well on the tests *will* help your grade. **Remember that math is not a spectator sport**, so the more problems you work yourself, the more practice you will get, the more confident you will be, and the better you will do in this course. Working on the problems helps you to figure out what your specific questions are. Remember an individual homework or quiz grade may not count for a lot in your overall grade, but working and learning from the homework is **essential** because this is where you learn the topics that will appear on the tests, which do count for a lot of your grade. The best lessons learned often come from correcting a quiz or homework problem in which you have made a mistake.

More Good Advice Keep absences to a minimum. You never know when you might miss something important either from the lecture or class discussion such as questions other students ask. Remember: **YOU ARE RESPONSIBLE FOR EVERYTHING THAT IS DISCUSSED DURING CLASS WHETHER YOU ARE PRESENT OR NOT.**

Also do not allow yourself to develop bad habits such as missing classes. It's human nature to be controlled by our habits, so once you develop a weekly habit for the semester, it can be hard to break this habit. So be sure that you allow the necessary time for this course **FROM THE BEGINNING OF THE TERM, ESPECIALLY** if you consider mathematics not to be your best subject. If you have trouble in math, then you should attend **EVERY** class of a college mathematics course. Not showing up to class or not doing the required work will not cause this class to "go away". If you are not understanding the material and/or have fallen behind in your work, missing class will not help. **IF YOU FALL BEHIND, PLEASE DO NOT DROP THIS COURSE WITHOUT TALKING TO ME FIRST.** Making mistakes or falling behind is natural, so it is best in this case to come to my office and talk to me about this. If you do have to miss class, let me know before class, and plan to come and see me and make an appointment to discuss what you missed and pick up assignments or discuss what you are not understanding. It is essential to get your questions answered, which you are welcome to do in my office. However meeting in my office is not a substitute for attending class.

Ask questions no matter how easy or trivial they may seem. There is no such thing as a bad or silly question. Questions result when you are interested and have been thinking about areas, such as mathematics, in which you have some limitations in your educational background. Being in a college mathematics course means you will have questions both obvious and more subtle. Asking questions is a very important part of learning.

Study and work problems regularly—every day or at least every other day. Work on assignments discussed in class as soon as you can after class while the methods discussed are still fresh in mind. You can't expect to succeed in a math course by waiting till the last minute to only study and cram prior to a test. If you promise yourself you will study for ½-hour, get into the work, forget the clock, then the next thing you know, you've studied and worked for one to two hours.

Classroom Conduct It is important to conduct yourself in a college classroom so that everyone can benefit from good communication between instructor and students. My goal is to create a classroom environment in which everyone can do their best work, learn, and make the best grades possible.

I think you will find that I am a very friendly, sympathetic, and generous instructor as long as you are sincerely working to succeed in this course and certain guidelines for classroom behavior are followed during class to allow a sanctity of study for your fellow students. Habits such as holding conversations during lecture, or being engaged in activities not related to this course such as working on a different course or reading your cell-phone will work against the goal of this course and cause you to be counted absent and you will lose attendance/participation credit. Also engaging with electronic communication devices of any kind during class or coming into class more than 5 minutes late or leaving early before class is dismissed circumvent the goals of this course and cause you to lose credit. My sympathy and generosity will quickly evaporate if I find that you are working against the goals of the course or that you are simply trying to get a good grade without learning or without honestly doing the required work. I want you to have every opportunity to succeed in this course.

Please be aware of the rules for Academic Honesty that you will find in the Sul Ross Student Handbook and building codes prohibiting food, beverages, tobacco (smokeless or otherwise) in the classroom. Use commonsense to think of anything else that will allow you to learn and do the best work that you can in this class, and for me to better help you do your best work.

Remember that being registered for this course does not allow you to behave in any manner you wish during class. You must keep other people in mind. It is within university policy for me to send a student out of this class on a temporary or permanent basis if disruptions or interruptions like the types listed above persist.

Equal Access and Students with Special Needs:

Sul Ross State University (SRSU) is committed to equal access in compliance with Americans with Disabilities Act of 1973. It is SRSU policy to provide reasonable accommodations to students with documented disabilities. It is the Student's responsibility to initiate a request. Please contact me, Ms. Rebecca Greathouse Wren, M.Ed., LPC-S, Director/Counselor, Accessibility Services Coordinator, Ferguson Hall (Suite 112) at 432.837.8203; mailing address is P.O. Box C-122, Sul Ross State University, Alpine, Texas 79832. Students should then contact the instructor as soon as possible to initiate the recommended accommodations.

Important Dates

Mon, January 13	First day of classes; late registration, schedule changes begin
Thu, January 16	Last day for late registration and schedule changes
Mon, January 20	Martin Luther King, Jr. Holiday, no classes
Wed, January 29	12th class day: last day to drop without creating an academic record
Fri, April 3	Last day to drop a course with grade of "W" by 4 pm in Registrar's Office
Fri, April 10	Good Friday Holiday, no classes
Mon, April 20	Honor's Convocation, 7 pm Marshall Auditorium
Wed, April 29	Last Class Day before finals
Thu, April 30	Dead Day, no classes
Fri, Mon-Wed, May 1, 4-6	Final Exams

Math 4320 Spring 2020 Tentative Course Outline		
X = No Classes	Tue	Thu
Jan. 14, 16	Chap. 1 Crisis in Math	Chap. 1 Sec. 2.1 Archimedean Understanding
Jan. 21, 23	Sec. 2.1 Archimedean Understanding	Sec. 2.2 Geometric Series
Jan. 28, 30	Theorems on Absolute Value	Sec. 2.3 Calculating Pi
Feb. 4, 6	Sec. 2.4 Logarithms and the Harmonic Series	Sec. 2.4 Logarithms and the Harmonic Series
Feb. 11, 13	Sec. 2.5 Taylor Series	Sec. 2.6 Emerging Doubts
Feb. 18, 20	Review for Test 1	Test 1
Feb. 25, 27	Sec. 3.1 Differentiability	Sec. 3.1 Differentiability
Mar. 3, 5	Sec. 3.2 Cauchy and the Mean Value Theorem	Sec. 3.2 Cauchy and the Mean Value Theorem
March 9-13, X - Spring Break, No Classes----->		
Mar. 17, 19	Sec. 3.3 Continuity	Sec. 3.3 Continuity
Mar. 24, 26	Sec. 3.4 Consequences of Continuity	Sec. 3.4 Consequences of Continuity
Mar. 31, Apr. 2	Review for Test 2	Test 2
Apr. 7, 9	Sec. 3.5 Consequences of the Mean Value Thm	Sec. 3.5 Consequences of the Mean Value Thm
Apr. 14, 16	Sec. 4.1: Completeness	Sec. 4.1: Completeness
Apr. 21, 23	Sec. 4.1 Basic Tests of Convergence	Sec. 4.1 Basic Tests of Convergence
Apr. 28	Review for Test 3	X - Dead Day Apr. 30
Mon. May 4	Test 3: May 4, 6-8 pm	