

MATH 3410, SPRING 2022

INTRODUCTION TO ANALYSIS

Class Website: Go to www.marktomforde.com, select “Teaching” and “Current Courses”.

On the website you will find homework as it is assigned, as well as a copy of this syllabus, exam dates, and announcements as they are made. NOTE: Video recordings of class meetings will be available on Canvas, but the Canvas page will not be used for any other aspects of the course. Assignments will be posted on the course webpage and homework will be collected and returned in class.

Course Description: This course is an introduction to Real Analysis, a major branch and cornerstone of modern mathematics. Real Analysis (as opposed to other fields of Analysis) deals with the real numbers and functions between them. We will study the construction and properties of the real numbers, which will rely heavily on the ordering of the reals and notion of “distance” provided by the absolute value. We will also develop the concepts of continuity, differentiability, and integrability for functions on the reals, and establish major results that include the Intermediate Value Theorem, the Extreme Value Theorem, the Mean Value Theorem, and the Fundamental Theorem of Calculus.

Instructor

Dr. Mark Tomforde
Office ENG 289

Class Meetings

MW 1:40--2:55PM in ENG105

Prerequisites

MATH 2150 and MATH 2350,
both with a C or better

Office Hours

MW 12:45PM--1:30PM
Office ENG 289

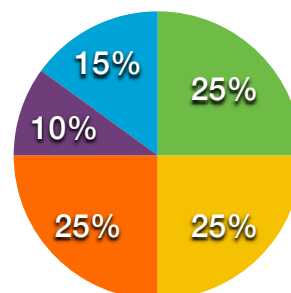
I encourage you to come by my office if you have questions, need help with homework problems, or want to talk about the material.

Objectives: Students will learn the basics of Real Analysis and be able to use the techniques of analysis to solve problems and prove results of their own. Great emphasis will be placed on effective writing and communication. Students will also be exposed to the notation, language, and methods used by professional mathematicians.

Textbook: *Elementary Analysis: The Theory of Calculus*, 2nd Ed., by Kenneth A. Ross. The textbook will be supplemented by notes from instructor.

Grading: Your final grade for the class will be determined as follows:

- **Class Participation: 10%**
- **Homework: 15%**
- **Exam 1: 25%**
- **Exam 2: 25%**
- **Final Exam: 25%**



Class Participation

Class participation is based on attendance, how engaged you are in class meetings, and completion of any in-class activities. It is vital to attend every class meeting and pay attention, particularly since some lecture material does not appear in the text. Questions on exams will be drawn from homework, reading, and lectures.

Homework

Homework problems with due dates will be given on the course web page. Your lowest homework score throughout the term will be dropped when calculating your final grade. This is meant to account for unexpected absences (e.g., illness or getting caught in traffic). Late homework will not be accepted for any reason. You are encouraged to discuss homework problems with others, but the write-up should be done by you alone and in your own words.

Homework Policies

- **Homework is due at the beginning of class on its due date. Late homework will not be accepted for any reason. Homework is late once I have started lecturing.**
- **Homework without a name will not be accepted.**
- **Homework will not be accepted by email.**
- **Homework should be written legibly and on only the front side of the paper. Leave enough room for the grader to make comments.**
- **Homework should be stapled in the upper-left-hand corner.**
- **Homework should be written on standard-sized paper (8.5" x 11"), with no "fringe" down the side as a result of the paper having been torn out of a spiral notebook**
- **Homework solutions should be presented in sequential order.**
- **Homework not picked up within one week of when it is returned will be discarded.**

Points will be deducted from homework for each infraction of the above policies.

Writing Proofs

You should think of proofs as writing assignments. When a problem asks you to prove (or show or verify) a proposition, you should write the proof up in “textbook style”. This should include a statement of the proposition you are proving, followed by a proof providing a clear and logically correct argument that explains to the reader why the result is true. Throughout the course you will get feedback on your proof writing, as well as see many examples of correctly written proofs in your textbook and in class, but you should be aware at the outset that **at a minimum, your proofs must contain complete sentences, proper spelling and grammar, and correct English usage.**

Reading Assignments

Reading assignments will be given weekly on the course web page. Completing the reading assignments is just as critical as doing the written homework. **You should read the assigned sections before we cover them in class**, so that you are prepared to answer questions or ask about material you do not understand.

Exams

There will be two exams and one final. All will be held in our usual classroom.

Exam 1: Wednesday, March 2 in class.

Exam 2: Wednesday, April 6 in class.

Final: Monday, May 9, 12:40PM – 2:40PM in our usual classroom.

Makeup Policy

Not being present for an exam or turning in an assignment late results in a score of zero, and you will not be allowed to make up the work. Exceptions may be made in the case of extreme circumstances, such as a documented, serious illness. In the event that you cannot be present to take an exam on the day it is held you need to speak to me in advance and make every attempt to do the work before (and not after) the rest of the class.

Important Dates

The following are some important dates you should keep in mind:

January 18, First Day of Classes

March 2, Exam 1

March 21 – 27, Spring Break, No Class

April 6, Exam 2

May 9 – 14, Finals Week

May 9, Final Exam scheduled from 12:40PM – 2:40PM

Math Center and Tutoring

The Math Center < <https://mathcenter.uccs.edu> > provides free tutoring and serves as a place for all UCCS students to do homework on their own, work on assignments with classmates, or just chat about math and math-related topics. Tutors are available to answer questions and to help you improve your understanding of and comfort with math courses. Whether you come in to work on math or just to have coffee, you'll find a welcoming and friendly environment.

PASS

There is a Peer Assisted Study Session (PASS) component for this course, which is available for all students who want to improve their understanding of the material. PASS meetings for this course will be held in-person two days per week and led by a student that has already taken the course and been trained to facilitate group student work. Students can use PASS meetings to work problems, compare class notes, review and discuss important concepts, develop strategies for studying, and prepare for exams. Attendance at PASS meetings is free and voluntary. PASS meetings begin the first or second week of class and continue throughout the semester.

PASS Leader: Carl Cassidy

Monday 5:45 -- 7:15PM, Engineering 187

Wednesday 5:45 -- 7:15PM, Centennial 191

Videos of Lectures

There is a Math Online section for this course, which means that lectures will be recorded for the Math Online students. Those of you in the regular section will also have access to the videos, and you can view them in Canvas under the Panopto Recordings. You may find these videos useful if you want to see the lecture again or if you miss class due to illness or another reason. Keep in mind that the videos are not a replacement for attending lecture, but should instead be used in combination with attending lecture to improve your understanding. Also note for this class Canvas will be used **only** to allow you access to the recorded lectures. Course information will be on the course website, homework will be turned in and passed back in person, and exams will be held in the classroom.

UCCS Wellness Center

The UCCS Wellness Center provides Mental Health Services to assist UCCS students. If you are experiencing personal or psychological matters that are complicating and interfering with your academic performance or your life, please reach out to them to see what assistance they can provide.

Mental Health Services Website: < <https://recwellness.uccs.edu/mental-health-services> >

If you would like to schedule an appointment with Mental Health Services, please call 719-255-4444.

Honor Principle

UCCS students are expected to adhere to the Academic Honesty Policy as described in the Student Handbook. In this course this shall mean the following: **Exams shall be worked on independently and without the use of your textbook, homework, or class notes. Homework may be discussed with others, but the write-up must be done on the student's own and in the student's own words, without the help of other people or outside sources. If you are aware of anyone who is cheating or receiving unfair outside assistance, you are honor bound to inform the professor of what is occurring, and you will be considered an accomplice if you do not.**

What Constitutes Cheating?

Your peers or other students may try to convenience that certain questionable activities or services are legitimate. Please be aware the the following are definite and unquestionable instances of cheating:

- Obtaining a Solutions Manual for the Course Textbook, and copying (all or part of) a solution to an assigned problem from the book.
- Googling a problem and copying the solution, especially if it is done so without understanding what you are writing.
- Using online services such as Chegg, Course Hero, Slader, Quizlet, etc. These businesses often bill themselves as “online learning platforms” and claim to provide legitimate assistance for students. In reality they are for-profit organizations that use deceptive and illegal business practices. Most of these businesses are guilty of copyright violations, privacy infringement, and unauthorized uses of material. It is also the case that a surprising number of their so-called “solutions” are incorrect. These businesses exist to take your money, and while they may temporarily help you to boost a grade in a course by allowing you to copy correct answers, the materials they provide actually obstruct your learning rather than facilitate it. You are far better off going to office hours, PASS meetings, and the Math Center, all of which are free and will help you to *actually learn the material* by building effective learning skills that will assist you in internalizing and applying the material.

Classroom Environment

As your professor, I hold the fundamental belief that everyone has a right to learn and deserves unrestricted access to education. I also believe that everyone in this class is fully capable of mastering the material. I value diversity, social justice, inclusion, and equality. I am therefore committed to creating a classroom environment that welcomes all students, regardless of race, gender, social class, sexual orientation, religious beliefs, etc. If there is anything causing barriers to your inclusion or achievement, please come talk to me. Likewise, any student with a disability or chronic health problem should talk to me about the types of assistance that might be offered.

COVID-19

If you have tested positive for COVID, are exhibiting symptoms of COVID, or have been exposed to someone with COVID, please do not come to class. Instead, contact the instructor to make arrangements for turning in work. Absences that occur to prevent COVID exposure will not count against your class attendance or class participation. Also, in this situation please notify the Wellness Center at < wellness@uccs.edu > for contact tracing purposes.

Mask Mandate

Official UCCS Statement on Face Coverings: All students are expected to wear face coverings while inside all UCCS buildings/facilities. Guidance and exceptions to wearing a face covering can be read in the full executive directive < <https://vcf.uccs.edu/policies/uccs/policies> >. Students may be asked to leave the class if they are not wearing a face covering, and additional disciplinary action may result in accordance with the Student Code of Conduct.

Purchasing Masks

For spring semester, UCCS has recommended that everyone wear N95 or KN95 respirators instead of cloth face masks as required in the fall. In the event you do not have an N95 or KN95, it is recommended that you double mask by wearing a surgical mask with a cloth mask over it.

What is the difference between masks and respirators? Both are similar looking face coverings. However, masks (e.g., commonly used cloth face masks) protect those around you as you talk, cough or sneeze. Respirators – when worn properly – are designed to not only protect others, but to protect you while you breathe in. Cloth face masks help block large particle droplets exhaled by you. N95 and KN95 respirators (sometimes also called N95 and KN95 masks) are designed to filter out 95% of non-oily airborne particles, including viruses and bacteria, as you inhale.

Since the emergence of COVID it has been estimated that approximately 60% of N95 and KN95 respirators/masks being sold on the U.S. open market are counterfeit and do not have the claimed protection. The counterfeiting is done at the manufacturing level, so often the store selling the masks will not even know they are counterfeit. Thus, if you have bought an N95 or KN95 via Amazon or a local retailer, there is a good chance it is counterfeit. A reliable source of genuine N95 and KN95s is the nonprofit ProjectN95 < <https://www.projectn95.org> >. They have reliable masks that are currently available for purchase.