Math 315: Elementary Analysis
Spring 2017
CRN 36535

Instructor: Max Kutler
Office: Fenton 209 **Email:** kutler@uoregon.edu
Office Hours: Tuesday, 10–11 AM; Wednesday, 1–2 PM; Friday, 10–11 AM; and by appointment
Class Meetings: 12–12:50 PM, MTWF, 193 Anstett

Course Webpage: http://pages.uoregon.edu/kutler/math315/.

Required Text: Stephen Abbott, *Understanding Analysis*

Prerequisite: Math 253; one of {232, 262, 307}

Workload: An average, well-prepared student should expect to spend 12 hours per week on this course, outside of regular class meetings. This includes time spent on homework exercises, reviewing lecture notes, reading the text, and studying for quizzes and exams.

Course Content: Motivated by the notions developed in the Math 251/2/3 sequence, we embark on a rigorous investigation of the nature of the real number system and functions of one real variable. We will encounter and solidify some ideas covered in those courses, notably limits, continuity, and differentiation. However, we will also delve deeper into the properties of the real line and encounter richness and complexities that we missed the first time around—complexities that, perhaps, threaten the very foundations of everything we learned in our first calculus courses. Topics in this direction include basic topology of the real line, compact and connected sets, a thorough treatment of sequences, uniform continuity, and the intermediate value theorem. We will emerge victorious, enlightened but humbled by the discovery that beneath our very feet, within our most sturdy houses, lie ghosts. We will have vanquished some, but how many more remain? Cautiously, we step forward.

Learning Outcomes: Students will demonstrate an understanding of the nature of mathematical proof by proving a wide variety of assertions. Proofs will involve, but are not limited to, limit computations (and related techniques, e.g. monotone sequences, Cauchy sequences, subsequences, limit points, $\limsup$, $\liminf$ etc.), continuity, compactness, and uniform continuity. So-called "ϵ-δ proofs" will be ubiquitous. The truly successful student will not only master these techniques, but will understand their role in the larger study we are undertaking. Indeed, the main concepts and techniques of analysis can seem dry and boring when considered in isolation; it is only through their proper application that we reveal Truth and Beauty.

Grading: Your grade will be based on homework, two midterm exams, and a cumulative final exam. Whichever of these four elements receives the highest score will count for 40% of your course grade; the remaining three elements will count for 20% each.
The grading scale will be roughly the following:

A	90%–100%
A–	85%–89%
B+	80%–84%
B	70%–79%
B–	65%–69%

and so on.

Exams:

1. Midterm Exam 1: **Friday, April 28 (End of Week 4)**
2. Midterm Exam 2: **Friday, May 26 (End of Week 8)**
3. Final Exam: **Thursday, June 15 at 10:15 AM (Week 11)**

Unless you contact me ahead of time or under extreme circumstances, no late work will be accepted, nor make-up exams given. The date and time of the final exam are non-negotiable.

Homework: There will be two homework assignments due each week. **All homework assignments will be due at the beginning of class on the due date.** Problem sets will typically consist of two to four exercises from the text. Solutions must be written clearly, legibly, and with appropriate style. See *Guidelines for Good Mathematical Writing* by Francis Su for more details.

You are encouraged to discuss the homework with other members of the class, and it is appropriate to acknowledge the assistance of others. Furthermore, you should feel free to use sources well beyond your textbook, personal notes, and past homework when crafting your solutions. You must, however, cite any such sources, and you must write up all of your final solutions on your own.

Graded homework may in some cases be rewritten and submitted at a later date. Details about such "rewrites" will be given in class, and you should see these rewrites as an opportunity to solidify your understanding of several of the key ideas you will encounter throughout the course. You are therefore strongly encouraged to take advantage of the opportunity to submit rewrites of your graded homework.

Student Conduct and Cheating: Violations of the student conduct code will be recorded on your student conduct record, and can result in a failing grade on any course work related to the violation or a failing grade in the course. The University of Oregon requires all instances of cheating be reported, no matter how small. Cheating includes, but is not limited to

- Looking at another student's exam during a test.
- Copying the work of another person (student or otherwise) and submitting it as your own.
- Using any materials except those explicitly approved during a test-taking situation.

For a list of other descriptions of cheating, see the Student Conduct Code.

Special Accommodations: If you are currently registered with the Accessible Education Center for a documented disability, please present your paperwork to me as close to the beginning of the term as possible so that we can design a plan for you. If you have a disability but are not registered with the AEC, you should contact them as soon as possible. It is much more likely that measures can be taken to provide adequate special accommodation if the organization is done through the AEC.

Title IX: I support Title IX and have a duty to report relevant information. The UO is committed to providing an environment free of all forms of prohibited discrimination and sexual harassment, including sexual assault, domestic and dating violence and gender-based stalking. Any UO employee who becomes aware that such behavior is occurring has a duty to report that information to their supervisor or the Office of Affirmative Action and Equal Opportunity.

The University Health Center and University Counseling and Testing Center can provide assistance and have a greater ability to work confidentially with students.