Math 290–001 (Introduction to Advanced Mathematics)
Fall 2019

Instructor: David Walnut
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Office hours: TR 10:30am–12:00pm, and by appointment.
Text: D. Smith, M. Eggen, R. St. Andre, *A Transition to Advanced Mathematics* (eighth edition)
Topics: The course will cover portions of Chapters 1–5 in the text.

General Comments:

The main purpose of this course is to teach the student how to write, read, and recognize correct mathematical proofs. Along the way, the student will be introduced to some elementary concepts of advanced mathematics including elementary propositional logic, set theory, relations, functions, and cardinality.

This course has been designated by the Math Department as a writing-intensive course. Therefore much emphasis will be laid on correct grammar, good organization and clarity of expression as well as correct logic in all graded work.

Content for this course will be delivered in the form of both in-class lectures and recorded lectures that should be watched outside of class. There will be some work done in class that may be collaborative in nature. Details on this will be provided as needed. Recorded lectures will be made available through BlackBoard.

A BlackBoard page will be set up for this course. This page will contain announcements, handouts, solutions to exams, class notes, and other important information. You should check BlackBoard regularly to avail yourself of these helpful resources.

You are required to be familiar with some flavor of the mathematical typesetting software TeX, such as LaTeX. You are not expected to come in with this familiarity, but it is required that you typeset solutions to the homework sets using TeX. More details on this will be available on the BlackBoard page for this course.

This class is identified as a Students as Scholars Scholarly Inquiry course. Through the individual written assignments and group work, emphasis will be placed on learning the type of thinking that is involved in understanding advanced mathematical concepts, and in furthering the mathematical enterprise. This includes learning how to formulate conjectures and proof strategies based on evidence gathered from examples, In addition, the student will learn the value of the proper formulation of a definition. All of these are basic skills required to understand the motivations and techniques that inform all mathematical research. Finally, students will learn how to write mathematics using the TeX software package which is how virtually all professional mathematics is written.

Grading:

Homework Exercises: Included with this syllabus is a list of homework exercises for the course taken from the exercises at the end of each section of the book. Students are expected to complete these homework problems in a timely fashion as the corresponding sections are covered in class. These exercises will not be collected. Collaboration is *encouraged* on these assignments.

Graded Writing Assignments: There will be approximately 10 short writing assignments given throughout the semester. The assignments will involve writing mathematically and grammatically

correct solutions to problems, usually involving proofs. Your grade for these assignments will be based on the correctness of your proofs and clarity and grammatical correctness of your writing. You will receive feedback on all writing assignments. The writing assignments will total at least 3500 words according to the guidelines of the Writing Across the Curriculum Committee. Precise assignments and due dates will given on BlackBoard. Collaboration is **not permitted** on these assignments.

There are *very specific* and *non-negotiable* requirements for all written assignments that have to do with how the assignment is written, how and in what form it is turned in, how the text is organized, and how the `.pdf` file is named. **If these requirements are not met, your assignment *will not be accepted*.** Details on these requirements will be posted on BlackBoard. The average of your written assignment scores will count for 50% of the final grade.

Semester Project: You will be required to submit a semester project consisting of a written paper of around 6-8 pages (12 point font, double spaced, not including illustrations) consisting of an exposition of a short mathematical paper chosen from a list that the instructor will provide. The goal of this assignment is to give you experience in reading published mathematical literature, and to understand the subject matter of the article you have chosen. You will receive feedback on this assignment before the final version is handed in according to the guidelines of the Writing Across the Curriculum Committee. Details and due dates will be posted on Blackboard. Your grade on the project will count for 15% of your final grade.

Midterm Exam: A midterm exam will be given on Thursday October 10, 2019. This exam will take the full class period. The midterm exam will count for 15% of the final grade. Makeup exams will be given only in cases of extreme hardship and then only when the student has ***contacted me in advance***. If I am not contacted in advance, no makeup will be given.

Final Exam: There will be a **cumulative final exam** given on Thursday, December 12, 2019, 7:30am–10:15am in the same room where we have class. The final exam will count for 20% of the final grade.

The grading scale is as follows, and is based on your correctly rounded semester average. There will be no curve.

A+:	98+	A:	93 - 97;	A-:	90 - 92;
B+:	88 - 89;	B:	83 - 87;	B-:	80 - 82;
C+:	78 - 79;	C:	73 - 77;	C-:	70 - 72;
D:	60 - 69;			F:	0 - 59

Homework Exercises

Section	Exercises
1.1	1(a), (b), (c), (g), 2(a)-(c), 3(a)-(c), 4(a)-(c), 5(a)-(c), 6(a),(d), 8(a), (b)
1.2	1(a), (b), (g), 2(for parts (a), (b), (g) of 1), 3(a)-(b), 4(a)-(b), 5(a),(d), 6(a), (b), 12(a), (e)
1.3	1(a)-(c), 2(for parts (a)-(c) of 1), 5, 8(a)-(c), 10(a)-(c)
1.4	5(a)-(e), 6(a)-(d), 7(a)-(e), 9(a)-(b)
1.5	3(a)-(c), 4(a)-(c), 6(a)-(b), 7(a)-(c)
1.6	1(a)-(c), 2(a)-(c), 4(a)-(c)
1.7	1(a)-(c), 2, 3(a)-(c), 5(a)-(c), 7(a)-(b), 8(a)-(c), 9(a)-(c)
1.8	6(a)-(c), 7(a), (b), (d), 9(a)-(b), 10, 11, 13, 15, 17(a)-(c)
2.1	4(a)-(c), 5(a)-(d), 6(a)-(b), 7, 8, 9, 14(a)-(b), 15(a)-(c), 17(a)-(c)
2.2	1(a)-(c), 2(a)-(c), 6(a)-(c), 9(a)-(c), 10(a)-(c), 11(a)-(c), 15(a)-(c)
2.3	1(g), (i), (n), (o), (p), 7, 8, 9(a), (b), 10, 16(a)-(c)
2.4	1(a)-(c), 2(a)-(c), 4(a)-(c), 5(a)-(c), 6(a)-(c)
2.5	1(a)-(c), 3, 2, 5(a)-(b), 7(a), (b), (d), 9, 13(a)-(b)
3.1	1(a)-(b), 2(a)-(c), 6(a)-(c), 7(a)-(c), 8(a)-(c), 9(a)-(c)
3.2	1(a)-(c), 2(a)-(c), 5(a)-(b), 6(a)-(c), 8(a)-(c), 11, 15(a), 17, 18
3.3	2(a)-(c), 3(a)-(c), 4(a)-(c), 6, 10
3.4	3, 8(a)-(b), 9(a)-(b), 10
3.5	1(a), (b), (c), (f), 2(a)-(c), 3, 4, 8, 9(a)-(b)
4.1	1(a), (b), (d), (i), (j)-(e), 13(a)-(c), 14(a)-(c), 15(a)-(c)
4.2	5(a)-(b), 9(a)-(b), 12
4.3	1(a)-(d), 2(for parts (a)-(d) of 1), 4, 5, 6, 9(a)-(c), 12(a)-(c)
4.4	1, 3(b), (d), 4, 5(a), 6, 8
4.5	1(a), 2(a)-(c), 4(a)-(c), 7(a)-(c), 10(a)-(b), 12(a)-(c), 13(a)-(b), 14(a)-(b)
5.1	4, 7(a)-(b), 8(a)-(b), 10, 12, 13, 17, 18(a)-(b), 19(a), (e)
5.2	1, 3(a)-(c), 4(a)-(c), 10, 11
5.3	5(a), (b), (d), 6, 7, 9(a)-(c), 11, 12(a)-(b), 14(a)-(b)2, 8(a)-(c), 10, 12, 13(a), 14(a)-(b)
5.4	3(a)-(b), 4(a)-(c), 5, 7, 9(a)-(c), 13(a)-(c), 11, 15
5.5	1(a)-(d), 3, 5, 8