

**SYLLABUS**  
**Mathematics 300 (Introduction to Abstract Math)**

W. R. WADE

**Office Hours** (Ayres Hall 319)

Monday-Wednesday-Friday 8:30-11:00, 3:00-3:30,  
Tuesday-Thursday 8:30-11:30, or by appointment.

Text available from Graphic Creations, 1809 Lake Avenue

Math 300 is a course designed to teach you how to analyze problems. Although the course focuses on how to write up proofs, the techniques you learn here, about constructing and presenting proofs, will prepare you for a variety of situations where analysis and communication are required including industrial jobs, academic jobs, teaching jobs, and graduate school. Despite the commonly held misconception that mathematicians “prove” things for a living, we discover things. proof is just a way of verifying them.

**Quote for the semester:**

A mathematician’s work is mostly a tangle of guesswork, analogy, wishful thinking, and frustration. Proof, far from being the core of discovery, is more often than not a way of making sure our minds are not playing tricks.  
*Gian-Carlo Rota*

There are few employers left who are willing to pay for repetitive tasks. Most such tasks (including even answering the telephone) have been computerized. Moreover, all employers require their employees to communicate with each other. (Group work is the norm these days.) Hence it is necessary that you learn both how to analyze problems without having a template for the solution and how to communicate your ideas in a convincing fashion.

Our goals, therefore, are to get you to a point where you can analyze carefully (NO FUZZY THINKING) and write with clarity (NO SKIPPED STEPS). To accomplish these goals, you need to make the transition from copying (all math courses thus far have presented you with templates to follow in solving problems) to creating (here you will be given ideas and will be required to come up with your own templates). WARNING! This process will be painful. My motto: hate me now but thank me later.

Each class will begin with students presenting their solutions of several of the preassigned problems (see list below) at the board. This will be followed with a careful critique of their solutions, some hints for discovering your own solutions, and a discussion of some of the new concepts necessary for the next assignment. At the end of the class, a written assignment will be made. Your solution to this assignment must be handed in at the beginning of the next class period. (Fold the assignment length-wise (like a book) and put your name

on the “front cover”.) The homework will be graded, then returned during the next class period.

In addition to homework, there will be 3 hour exams evenly spaced throughout the semester, and a comprehensive examination which will be given on **Wednesday, December 7 at 10:15–12:15**

Each hour exam will be worth 100 points, the total collection of homework will be worth a total of 100 points, and the final examination will be worth 200 points. At the end of the semester I will average your scores on these tests and assign grades according to the following scale: 88-100 A or A-; 76-87 B+, B or B-; 66-75 C+, C, or C-; 60-66 D+ or D.

## SCHEDULE OF HOMEWORK ASSIGNMENTS AND EXAMS

Class number—Assignment or activity due on that day

**Class 1.** (August 17) Introductory Lecture

**Class 2.** (August 19) Page 8: 1–3, 5, 7

**Class 3.** (August 22) Page 12: 8–9, 15–18

**Class 4.** (August 24) Page 17: 21–24

**Class 5.** (August 26) Page 17: 25–28

**Class 6.** (August 29) Page 20: 29–32, 35–36

**Class 7.** (August 31) Page 24: 1–3

**Class 8.** (September 2) Page 28: 4, 6–7

**September 5: HOLIDAY** *Labor Day*

**Class 9.** (September 7) Page 28: 5, 8–9

**Class 10.** (September 9) Review and Introduction to Functions

**Class 11.** FIRST HOUR EXAM (September 12)

**Class 12.** (September 14) Page 33: 1a, b, 2–3, 4a

**Class 13.** (September 16) Page 33: 1c, d, 5–6, 7a,b

**Class 14.** (September 19) Page 38: 8a,b,c, 9

**Class 15.** (September 21) Page 38: 8d,e,f,g

**Class 16.** (September 23) Page 44: 1–4

**Class 17.** (September 26) Page 46: 6–11

**Class 18.** (September 28) Page 49: 14–18, 26

**September 29–30: HOLIDAY** (Fall Break)

**Class 19.** (October 3) Page 50: 19–24, 28

**Class 20.** (October 5) Page 52: 31–35

**Class 21.** (October 7) Page 53: 36–44

**Class 22.** (October 10) Page 56: 46–49, 52

**Class 23.** (October 12) Page 57: 53–59, 61–63

**Class 24.** (October 14) Review and Introduction to Field Axioms

**Class 25.** SECOND HOUR EXAM (October 17)

**Class 26.** (October 19) Page 60: 1–5

**Class 27.** (October 21) Page 60: 6–9

**Class 28.** (October 24) Page 64: 10–14, 22, 24–26

**Class 29.** (October 26) Page 64: 15–21, 27–28

**Class 30.** (October 28) Page 66: 29–35

**Class 31.** (October 31) Page 66: 36–40, 43

**Class 32.** (November 2) Page 68: 44–45, 47–48, 52–53

**Class 33.** (November 4) Page 68: 46, 49, 51, 54

**Class 34.** (November 7) Page 71: 56–60

- Class 35.** (November 9) Page 73: 69–76, 84–85  
**Class 36.** THIRD HOUR EXAM (November 11)  
**Class 37.** (November 14) Page 78: 1–4  
**Class 38.** (November 16) Page 78: 5–9  
**Class 39.** (November 18) Page 81: 14–15  
**Class 40.** (November 21) Page 88: 39–44  
**Class 41.** (November 23) Page 88: 45–46, 48–50  
**November 24-25: HOLIDAY** (Thanksgiving)  
**Class 42.** (November 28) REVIEW OF COURSE  
**Class 43.** (December 7 at 10:15) FINAL EXAM