

MATH245 Introduction to Proof Fall 2022

Lectures Mondays, Wednesdays, Fridays 11.15am-12.05pm Gore 317

Instructor Dr. Sebastian Cioabă, cioaba@udel.edu

Office Hours Mondays and Wednesdays 12.30-1.30pm Ewing 506 or by appointment.

Textbook *A Bridge to Advanced Mathematics: From Natural to Complex Numbers* by Sebastian M. Cioabă and Werner Linde; excerpts from the book will be made available to the students registered for this class.

Course Description

This course is a transition/bridge from the calculus-based courses or more elementary undergraduate courses to more abstract courses such as abstract algebra or real analysis. It involves mathematical proofs and rigorous treatment of several areas, which are in the foundation of modern mathematics. The content will include basics of logic, set theory, functions, theory of integers, rational, real and complex numbers, inequalities and limits of sequences. Additional topics will be chosen from arithmetic and geometric progressions, number theory, graph theory, counting.

The objectives of this course are to learn new mathematics, to rigorously prove mathematical statements involving the above topics and to write correct proofs of such mathematical statements. See the last page for a detailed list of topics we plan to cover in this course.

The class lectures may present the material in a different form and even in a different order from the textbook. This means that you will have two sources of learning available to you. You should make sure you read them both as this will enhance your understanding and enable you to follow future lectures in class.

It is important that you put a consistent and strong effort into learning this material. Mathematics is a constructive subject building on earlier material. You should stay on top of the subject by spending some time on it every day, and not just cram for exams. Otherwise, this course will leave you behind. Focus on understanding the material and key concepts and not on memorizing proofs.

In teaching undergraduate courses, I have met students that had trouble studying mathematics. The best way to study mathematics is with a pen and paper in a quiet and relaxing space while all the electronics and other distractions are off. In case you need study/learning tips, I have found the book *Make it stick: The Science of Successful Learning* by Peter C. Brown, Henry L. Roediger III and Mark McDaniel, very useful and interesting. I highly recommend it!

When studying in this class, remember that the labor market values

the highly analytical individual that can think abstractly. ¹

¹See page 2 of *Academically Adrift: Limited Learning on College Campuses* by Richard Arrum and Josipa Roksa, The University of Chicago Press 2011.

Grading Scheme

Your final grade will be calculated based on your attendance and performance in assignments and exams.

Homework I will assign homework every week or so. The homework will contribute 40% to your final grade. I will drop the lowest homework grade from this calculation.

In-term exams I plan to have 3 exams roughly spaced 1 month apart throughout the semester: Wednesday Sept 21, October 19, and November 16. The exams will be held during class and each will last 50 minutes. Each exam will be worth 10% of your final grade and the total contribution of the exams will be 30% to your final grade.

Final Exam The final exam will be worth 30% of your final grade. It will be a 2 hours exam scheduled on December 14, 2022 between 8.30am and 10.30am in Gore 317.

Typos in the Booklet If you spot a typo/error in the booklet and confirm it with me, you can get 0.5% towards your grade (and an acknowledgment in the preface of the book).

The final number grade will be calculated by the taking **the maximum** of the two following expressions:

Homework (40%)+ 3 Midterms(30%)+Final Exam(30%)+Typos

Homework(40%)+ 2 Best Midterms(20%)+ Final Exam (40%)+Typos

The correspondence between the number grade and the letter grade is the following:

A(90-100), A-(85-90), B+(80-85), B(75-80), B-(70-75), C+(65-70),C(60-65),C-(55-60), D(50-55), F(less than 50).

Resources

If you need help, please come and see me during office hours (Mondays or Wednesdays 12.30-1.30pm) or email me to schedule an appointment at a different time (in person or by zoom).

Please do not wait until later in the semester to ask for help.

Before coming to office hours to ask questions regarding a certain problem, **please make a serious effort (study carefully your notes from class and the textbook and work on the problem at least 15 minutes)** to solve the problem on your own and write down your ideas so that we can discuss them.

The Office of Academic Enrichment <http://ae.udel.edu/> has various resources to help students (list of tutors, supplemental instruction, study skills workshop etc.).