

Math 300: Introduction to Advanced Mathematics

Sections 003 and 004

Spring 2022

George Mason University

Course meetings:

Section 003: 10:30 am - 11:45 am TR, Peterson Hall 2411

Section 004: 9:00 am - 10:15 am TR, Peterson Hall 1109

Instructor: Harry Bray, he/him/his, hbray@gmu.edu,
Exploratory Hall, Room 4453

Learning Assistants (LAs):

Aidan Donahue, he/him/his

Swan Klein, she/her/hers

Office hours: Specific drop-in times with the instructor and learning assistants are to be announced. Office hours by appointment can be arranged with the instructor, Professor Harry Bray, by email or after class.

There will be both in-person and virtual (via Zoom) office hour options.

Prerequisites: Both of the following are required:

- A C/XS or better in Math 114 or 116.
- A C/XS or better in Math 125 or Math 175.

Course materials: No printed textbook required. Notes from me along with access to an open source book for some initial material will serve as the equivalent to a “textbook”. A link to these materials will be made available on Blackboard.

Technology

Students are expected to have reliable internet connection to engage with some aspects of the course, or in the event of a mandated quarantine due to COVID-19. The following software is required for all students:

- Blackboard
- Zoom
- Gradescope

We may also use Jamboard for any virtual activities such as office hours. Students are encouraged, but not required, to use Overleaf for certain assessments.

Course topics and goals:

This course aims to prepare students for success in later courses in advanced undergraduate mathematics and beyond. Essential skills include clear reasoning, writing

and speaking about mathematics, proving results, building skills in problem solving, investigation, conjecture, visualization, computing, and making connections to prior knowledge. The processes of abstraction and generalization will be explicitly acknowledged during the course. A range of proof techniques will appear and we will discuss the thinking behind these techniques. The mathematics we learn should enhance your interest in the subject also.

The central theme of our experimental variant is the complex number system. The complex setting is simultaneously similar to and yet quite different from corresponding real number situations. Building on some high school experiences and calculus of one real variable, we will investigate specific examples and develop general statements about complex polynomials, rational functions, and some of the transcendental functions familiar in calculus for a real input. There will be glimpses of algebra, analysis, geometry, number theory, combinatorics, and topology in our work, along with a dose of history. Historically, the development of these topics led to many branches of modern mathematics emerging or evolving and are fundamental to modern physics and signal processing.

Structure of the course:

Unless communicated otherwise by the instructor or the University, the instructor will host class meetings during the scheduled class meeting time at the designated meeting place. During class time, students will receive support with the material and course work. In general, these meetings will **not** be traditional style lecture classes. Students will often work either individually or in small groups on problems posed by the instructor. Some of these problems may appear as part of short writing assignments discussed below.

Writing assignments. There will be approximately 10 **short writing assignments** given throughout the semester, along with **two long essays** that are more expository than the short ones. The first of these will require a revised submission after feedback on the initial version. The short assignments will involve writing mathematically and grammatically correct solutions to problems, usually involving proofs. Your grade for these assignments will be based on multiple criteria: the correctness of your proofs for designated problems and clarity and correctness of your writing in general, along with effort even if unsuccessful on more challenging problems. Your writing assignments will total at least 3500 words according to the guidelines of the Writing Across the Curriculum Committee. Feedback will be given. Precise assignments and due dates will given on Blackboard.

Reading assignments. Before most classes, students will be asked to read provided course material and submit short responses. These **reading assignments** will guide our class discussions the following day. Reading assignments will be graded on a completion basis, with feedback which may be delivered in writing or during class.

Grading:

Students will be graded based on short writing assignments, long essays, reading assignments, one midterm exam, and one final exam.

Each student receives a final numerical score based on the following breakdown:

Assessment	Percentage of final grade
Short writing assignment average	30%
Long essay average	30%
Reading assignment	5%
Midterm	15%
Final	20%

A student's numerical grade is then converted to a final letter grade based on the following grade intervals:

A: [89.5, 100] B: [79.5, 89.4) C: [69.5, 79.5) D: [59.5, 69.5) F: [0, 59.5)

Assignments of +/- will be based on grade distribution.

All written assessments will be submitted via Gradescope. Writing assignments will be submitted by the students. Some assessments may be collected in class and submitted by the instructor on the students' behalf.

Exams:

Exams are scheduled as follows:

Midterm	Thursday March 10
Final	The final exam for Section 003 is scheduled for Thursday May 17, 10:30am to 1:15pm. The final exam for Section 004 is scheduled for Tuesday May 12, 7:30am to 10:15am.

All students are expected to complete exams as scheduled and to be available to complete these exams at any dates and times indicated here. **Any unavoidable conflicts must be communicated to the instructor immediately.** Any accommodation of conflicts is at the sole discretion of the instructor.

Important dates

As listed here: https://registrar.gmu.edu/calendars/spring_2022-1/#dates:

Last day to add	Mon Jan 31
Last day to drop with 100% tuition refund	Mon Feb 7
Last day to drop with 50% tuition refund	Mon Feb 14
End of withdrawal period for undergraduates	Mon Apr 11

Conduct, collaboration, and academic integrity:

You are expected to follow the GMU Honor Code:

<https://oai.gmu.edu/mason-honor-code/>

For individual assessments, although students are encouraged to discuss written assignments to generate ideas, **it is your responsibility to write the final product on your own.** No collaboration is allowed on tests. Any indication that you have copied, or allowed fellow student(s) to copy your work for these assessments is a violation of the GMU Honor Code.

Some of the behaviors that will be considered cheating include:

- Communicating with another person during an assessment which does not allow for collaboration.
- Copying material from another person for **any assignment being graded** and submitting it as if it is your own individual work.
- Allowing another person to copy from any assignment being graded.
- Use of unauthorized assistance on any assignment being graded.
- Use of unauthorized notes, books, calculators or cellphones during an assessment.
- Providing or receiving a copy of a quiz or exam used in the course.

Services and accommodations: If you have a learning or physical difference that may affect your academic work, please see me and contact the Office of Disability Services (ODS) at 993-2474, <http://ods.gmu.edu>. All academic accommodations must be arranged through the ODS.

Counseling and Psychological Services are available for GMU students: <http://caps.gmu.edu> / 703-993-2380

Inclusivity and equity: George Mason University is an intentionally inclusive community that promotes and maintains an equitable and just work and learning environment. We welcome and value individuals and their differences including race, economic status, gender expression and identity, sex, sexual orientation, ethnicity, national origin, first language, religion, age, and disability. I invite students to come to me with any concerns about inequitable access or treatment in this course.

University policies: The University Catalog, <http://catalog.gmu.edu>, is the central resource for university policies affecting students, faculty and staff conduct in university academic affairs. Other policies are available at <http://universitypolicy.gmu.edu/>. All members of the university community are responsible for knowing and following established policies.