

Math 300 Introduction to Advanced Mathematics

Course Syllabus

instructor	Casey Blacker
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office	Research Hall room 261
office hours	MW 10–11
course modality	in person
lecture	TR 5:55–7:10 Music/Theater Building 1004
text	<i>A Transition to Advanced Mathematics</i> , by Smith, Eggen and St. Andre (Eighth Edition)

Course Overview. The primary aims of this course are, first, to learn how to clearly and effectively articulate mathematical intuitions using the conventions of professional mathematics and, second, to identify proof techniques appropriate to a given problem and to plan a carry out the corresponding proof. A secondary aim is to acquaint the student with those techniques and constructions that are ubiquitous and unstated throughout the mathematical literature that they will meet in later courses. This includes sets, functions, relations, operations, induction, quantifiers, and common notions in algebra and analysis.

Prerequisites. Grade of C or higher in Math 114/16 and Math 125/75.

Learning Outcomes. On successful completion of this course, students will be able to

- independently approach proof-based undergraduate mathematical literature,
- identify and employ the conventional style and diction of professional mathematics,
- clearly and effectively articulate their mathematical intuitions,
- identify proof techniques appropriate to a give problem and plan and carry out a written proof,
- use the LaTeX typesetting system,
- understand elementary set theory—including sets, relations, functions, and cardinality—as well as rudimentary concepts in algebra and analysis.

Mathematical Style Guides

- *A Primer of Mathematical Writing*, Steven Krantz (Second Edition)
https://wrlc-gm.primo.exlibrisgroup.com/permalink/01WRLC_GML/19u1omk/cdi_proquest_ebookcentral_EBC5188445
- *How to Write Mathematics*, Paul Halmos
<https://www.e-periodica.ch/cntmng?pid=ens-001%3A1970%3A16%3A%3A59>
- *Mathematical Writing*, Franco Vivaldi
https://wrlc-gm.primo.exlibrisgroup.com/permalink/01WRLC_GML/1prj2t5/alma9946893957204105
- *Writing Mathematics Well*, Leonard Gillman
https://wrlc-gm.primo.exlibrisgroup.com/permalink/01WRLC_GML/19u1omk/cdi_proquest_ebookcentral_EBC7015916

Typesetting Style Guides

- *AMS Style Guide*, Mary Letourneau and Jennifer Wright Sharp
<https://www.ams.org/publications/authors/AMS-StyleGuide-online.pdf>

- *Journals of the London Mathematical Society*, Sue Rodd and Ola Törnkvist
<https://www.lms.ac.uk/sites/default/files/Publications/LMSHouseStyle.pdf>

Heuristics

- *How to Solve It*, George Pólya and John Conway
https://wrlc-gm.primo.exlibrisgroup.com/permalink/01WRLC_GML/1giah39/alma9912566479804101

Case Studies

- *Finite Dimensional Vector Spaces*, Paul Halmos
https://wrlc-gm.primo.exlibrisgroup.com/permalink/01WRLC_GML/1prj2t5/alma9912368633204101
- *Naive Set Theory*, Paul Halmos
https://wrlc-gm.primo.exlibrisgroup.com/permalink/01WRLC_GML/1giah39/alma994200853404105
- *Linear Algebra*, Serge Lang
https://wrlc-gm.primo.exlibrisgroup.com/permalink/01WRLC_GML/19u1omk/cdi_askewsholts_vlebooks_9781475719499
- *Principles of Mathematical Analysis*, Walter Rudin
https://wrlc-gm.primo.exlibrisgroup.com/permalink/01WRLC_GML/1giah39/alma991088893404105
- *Differential Geometry of Curves and Surfaces*, Manfredo do Carmo
https://wrlc-gm.primo.exlibrisgroup.com/permalink/01WRLC_GML/19u1omk/cdi_askewsholts_vlebooks_9780486817972
- *Abstract Algebra*, David Dummit and Richard Foote
https://wrlc-gm.primo.exlibrisgroup.com/permalink/01WRLC_GML/1prj2t5/alma9911892563404105
- *Topology*, James Munkres
https://wrlc-gm.primo.exlibrisgroup.com/permalink/01WRLC_GML/1prj2t5/alma9911124323404105
- *Topology from the Differentiable Viewpoint*, John Milnor
https://wrlc-gm.primo.exlibrisgroup.com/permalink/01WRLC_GML/1prj2t5/alma997140113404105

Assessment

homework	20%
writing assignment 1/2	15%
midterm 1/2	15%
final exam	20%

Assessment Schedule

midterm 1	Thu, Feb 20
writing assignment 1	Tue, Mar 25
midterm 2	Thu, Mar 27
writing assignment 2	Thu, May 1
final exam	Thu, May 8

LaTeX. You are required to use the LaTeX typesetting system for Writing Assignments 1 and 2 as well as on later homework assignments. No prior experience with LaTeX is assumed.

Mason Core Curriculum. This course is part of the Mason Core curriculum and fulfills requirements for the Writing Intensive category.

Attendance. You are expected to attend each lecture. Any absence from a midterm or exam will result in a score of 0. If the absence is accompanied by a doctor's note, you may take the assessment expeditiously when your health allows.

Homework. Homework should be completed by the indicated deadline. Late work is liable to receive no credit. While you are encouraged to work together with your peers, all submitted work should be your own.

Special Dates

Jan 21	first day of class
Mar 10–16	Spring Recess (no class)
May 1	last day of class
May 8	final exam, 4:30–7:15

Grading Policy

	A+	A	A–	B+	B	B–	C+	C	D	F
<i>starts at</i>	98	92	90	88	82	80	78	70	60	0

Calculator Policy. No calculators are allowed on the midterms or the final exam.

Blackboard

- This course will be hosted on Blackboard for the Fall 2024 semester. Please ensure you are familiar with accessing and navigating this platform.
- Resources and support are available at <https://lms.gmu.edu/getting-started-students> to help you get started. If you have any questions, do not hesitate to reach out to me or contact the ITS Support Center (<https://its.gmu.edu/service/its-support-center>) for assistance.

Academic Standards

Academic Standards exist to promote authentic scholarship, support the institution's goal of maintaining high standards of academic excellence, and encourage continued ethical behavior of faculty and students to cultivate an educational community which values integrity and produces graduates who carry this commitment forward into professional practice.

As members of the George Mason University community, we are committed to fostering an environment of trust, respect, and scholarly excellence. Our academic standards are the foundation of this commitment, guiding our behavior and interactions within this academic community. The practices for implementing these standards adapt to modern practices, disciplinary contexts, and technological advancements. Our standards are embodied in our courses, policies, and scholarship, and are upheld in the following principles:

- **Honesty:** Providing accurate information in all academic endeavors, including communications, assignments, and examinations.
- **Acknowledgement:** Giving proper credit for all contributions to one's work. This involves the use of accurate citations and references for any ideas, words, or materials created by others in the style appropriate to the discipline. It also includes acknowledging shared authorship in group projects, co-authored pieces, and project reports.
- **Uniqueness of Work:** Ensuring that all submitted work is the result of one's own effort and is original, including free from self-plagiarism. This principle extends to written assignments, code, presentations, exams, and all other forms of academic work.

Violations of these standards—including but not limited to plagiarism, fabrication, and cheating—are taken seriously and will be addressed in accordance with university policies. The process for reporting, investigating, and adjudicating violations is outlined in the university’s procedures (<https://academicstandards.gmu.edu>). Consequences of violations may include academic sanctions, disciplinary actions, and other measures necessary to uphold the integrity of our academic community.

The principles outlined in these academic standards reflect our collective commitment to upholding the highest standards of honesty, acknowledgement, and uniqueness of work. By adhering to these principles, we ensure the continued excellence and integrity of George Mason University’s academic community.

Student Responsibility. Students are responsible for understanding how these general expectations regarding academic standards apply to each course, assignment, or exam they participate in; students should ask their instructor for clarification on any aspect that is not clear to them.

Generative AI. Use of generative AI tools should follow the fundamental principles of the university Honor Code.

Accommodations for Students with Disabilities

Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit <https://ds.gmu.edu> for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu. Phone: (703) 993-2474.

Student responsibility. Students are responsible for registering with Disability Services and communicating about their approved accommodations with their instructor *in advance* of any relevant class meeting, assignment, or exam.

FERPA and Use of GMU Email Addresses for Course Communication

The Family Educational Rights and Privacy Act (FERPA, <https://www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html>) governs the disclosure of education records for eligible students (<https://registrar.gmu.edu/ferpa>) and is an essential aspect of any course. **Students must use their GMU email account** to receive important University information, including communications related to this class. Instructors will not respond to messages sent from or send messages regarding course content to a non-GMU email address.

Student Responsibility. Students are responsible for checking their GMU email regularly for course-related information, and/or ensuring that GMU email messages are forwarded to an account they do check.

Title IX Resources and Required Reporting

As a part of George Mason University’s commitment to providing a safe and non-discriminatory learning, living, and working environment for all members of the University community, the University does not discriminate on the basis of sex or gender in any of its education or employment programs and activities. Accordingly, **all non-confidential employees, including your faculty member, have a legal requirement to report to the Title IX Coordinator, all relevant details obtained directly or indirectly about any incident of Prohibited Conduct** (such as sexual harassment, sexual assault, gender-based stalking, dating/domestic violence). Upon notifying the Title IX Coordinator of possible Prohibited Conduct, the Title IX Coordinator will assess the report and determine if outreach is required. If outreach is required, the individual the report is about (the “Complainant”) will receive a communication, likely in the form of an email, offering that person the option to meet with a representative of the Title IX office.

For more information about non-confidential employees, resources, and Prohibited Conduct, please see University Policy 1202: Sexual and Gender-Based Misconduct and Other Forms of Interpersonal Violence (<https://universitypolicy.gmu.edu/policies/sexual-harassment-policy>). Questions regarding Title IX can be directed to the Title IX Coordinator via email to TitleIX@gmu.edu, by phone at 703-993-8730, or in person on the Fairfax campus in Aquia 373.

Student Opportunity. If you prefer to speak to someone ***confidentially***, please contact one of Mason's confidential employees in Student Support and Advocacy (SSAC, <https://ssac.gmu.edu>), Counseling and Psychological Services (CAPS, <https://caps.gmu.edu>), Student Health Services (SHS, <https://shs.gmu.edu>), and/or the Office of the University Ombudsperson (<https://ombuds.gmu.edu>).