COURSE DESCRIPTIONS (FALL 2026)

The following courses are (tentatively) being offered for the Fall 2026 semester. Descriptions have been given by some instructors; more may be added over time. Note that slashlisted courses, quals courses, and topics courses have been collected separately in this document for your convenience.

Courses

(MATH 5253) Intro-Math Pedagogy Research

Instructor: Sepideh Stewart

Description from Instructor: This course offers a practical, hands-on introduction to mathematics education research at the university level. Students will engage with foundational literature in mathematics education and develop the methodological tools needed to design a research proposal grounded in current scholarship.

(MATH 5423) Complex Analysis I

Instructor: Meijun Zhu

Official Catalog Description: Prerequisite: 4433. The complex numbers, topologies of the extended plane and related sphere, elementary functions, power series, properties of general holomorphic functions. The integral of a complex-valued function over an oriented rectifiable curve, the classical theorems on integrals, Taylor and Laurent expansions, analytic continuation, introduction to Riemann surfaces.

(MATH 6373) Commutative Algebra I

Instructor: Murad Ozaydin

Description from Instructor: This is a standard course serving as a prerequisite for math 6383 Algebraic Geometry and also relevant for Number Theory. After a brief review of rings (= unital commutative rings), ideals and modules, topics including prime ideals, spectra, localization, Noetherian and Artinian rings, Hilbert basis theorem, nullstellensatz and dimension theory will be covered. I plan to use referencesavailable online, basically corresponding to the material in Atiyah-MacDonald.

(MATH 6473) Functional Analysis I

Instructor: Alejandro Chavez Dominguez

Official Catalog Description: Prerequisite: 5463 or permission of instructor. Vector spaces with topology or norm, dual space, theorems on linear operators, spectral theory in Hilbert space, spectral decomposition of operators, convex sets and weak topologies, fixed point theorems.

(MATH 6813) Algebraic Topology I

Instructor: Alexander E. Mramor

Official Catalog Description: Prerequisite: 5863. Introduction to homology theory of spaces, fundamental group and covering spaces, higher homotopy groups, CW-complexes and cellular homology, Whitehead and Hurewicz theorems, Eilenberg-Steenrod axioms.

Slashlisted Courses

A *slashlisted course* is a single course offered under two different numbers: a 4000-level for undergraduates and a 5000-level for graduates. Graduate students must enroll in the 5000-level version to earn credit towards their degree and should therefore expect to complete additional material beyond students enrolled in the 4000-level version.

(MATH 5123) Fourier Transforms
Instructor: Tomasz Przebinda
Official Catalog Description: Prerequisite: graduate standing and MATH 2443 or 2934, MATH 3113 or MATH 3413, MATH 3333, or permission of the instructor. Fourier series, classical Fourier transform, discrete Fourier transform, distributions and Fourier transforms. Sampling and Shannon's Theorem. No student may earn credit for both 4123 and 5123.

(MATH 5373) Abstract Linear Algebra
Instructor: Gregory Muller
Official Catalog Description: Prerequisite: 3333. Vector spaces over arbitrary fields, bases, dimension, linear transformations and matrices, similarity and its canonical forms (rational, Jordan), spectral theorem and diagonalization of quadratic forms. No student may earn credit for both 4373 and 5373.

(MATH 5653) Intro-Differential Geometry I
Instructor: Ricardo Mendes
Official Catalog Description: Prerequisite: graduate standing and MATH 2443 or MATH 2934, and MATH 3333, or permission of instructor. Elementary theory of curves and surfaces in three-dimensional Euclidean space, differentiable manifolds, Riemannian geometry of two dimensions, Gauss Theorem Egregium. No student may earn credit for both 4653 and 5653.

(MATH 5673) Graph Theory I
Instructor: None currently; may be cancelled
Official Catalog Description: Prerequisite: 2513 or permission of instructor. An introduction to the theory of graphs. Topics include basic definitions, cutpoints, blocks, trees, connectivity and Menger's theorem. No student may earn credit for both 4673 and 5673.

Qualifying Exam Courses

These are the three sequences offered each year, on the three qualifying exam topics.

(MATH 5353) Abstract Algebra I
Instructor: Andras Lorincz
Official Catalog Description: Prerequisite: 4323, permission of instructor. Groups, Sylow theorems, group actions, group presentations. Rings, ideals, polynomial rings, unique factorization. Fields, algebraic and transcendental extensions.

(MATH 5453) Real Analysis I
Instructor: Christian Remling
Official Catalog Description: Prerequisite: 4433 or permission of instructor. Lebesgue measure and integration theory, absolutely continuous functions, metric spaces.

(MATH 5853) Topology I
Instructor: Michael Jablonski
Official Catalog Description: Prerequisite: 2433 and 2513. Set theory, separation axioms, connectedness, compactness, continuity, metric spaces, nets and sequences.

Topics courses

Topics courses cover material at the discretion of the instructor. Two topics courses with the same name and number may cover significantly different material in different semesters. Topics courses may be repeated for credit; however, each course number has a limit on how many times it can be taken for credit.
Literacy courses are a special kind of topics course which are co-taught by three professors. Each professor teaches one-third of the semester on a topic of their choice.

(MATH 6833) Topics In Topology I
Instructor: Yan Mary He
Description from Instructor:
Measured Laminations and Geodesic Currents on Closed Hyperbolic Surfaces
This graduate topics course introduces two central objects in the modern study of hyperbolic surfaces: measured laminations and geodesic currents. Focusing on closed hyperbolic surfaces, the course develops the basic definitions, topological and geometric properties, and key examples of these spaces, together with the structures and pairings that make them fundamental tools in low-dimensional geometry/topology and Teichmller theory. Standard topics include geodesic laminations, transverse measures, intersection numbers, weak-* topology, compactness properties, and the embedding of curves and laminations into the space of currents. Time permitting, the course may also discuss applications to mapping class groups, Teichmller space, and hyperbolic geometry. The course is intended for graduate students with some background in differential geometry or geometric topology.