

Math 582 D – Tropical Geometry – Winter 2025

Lecture: TTh 9-10:20am in PDL C-401

Instructor: Cynthia Vinzant (vinzant@uw.edu, PDL C-439)

Textbook: D. Maclagan and B. Sturmfels, *Introduction to Tropical Geometry*, Graduate Studies in Mathematics, 161. American Mathematical Society, 2015. Additional resources will be posted on the course website.

Course website: <http://sites.math.washington.edu/~vinzant/teaching/582D/>

Prerequisites: Some familiarity with ideals and varieties will be assumed. Familiarity with polyhedra is not necessary but will be helpful.

Course Description: Tropical geometry is the study of certain combinatorial shadows of solutions to systems of polynomial equations. It is based on tropical algebra, where the sum of two numbers is their minimum and the product is their sum. This turns polynomials into piecewise-linear functions, and their zero sets into polyhedral complexes. These combinatorial structures retain a surprising amount of information about their classical counterparts. This course will introduce and survey some topics in tropical geometry, including Puiseux series and valuations, Grobner complexes, tropical varieties, hyperplane arrangements and matroids, Bernstein's theorem, Viro's patchworking, and combinatorial Hodge theory.

Homework: Homework will be assigned every one to two weeks and collected on Gradescope.

Final Project: Students will write a final paper on a topic related to tropical geometry and give a presentation in class at the end of the quarter. Further details and suggested topics will be posted on the course website and discussed in class.

Grades: Grades will be assigned based on homework (60%), oral presentation of the final project (15%), and written final project (25%).

Academic Integrity: The University takes academic integrity very seriously. Behaving with integrity is part of our responsibility to our shared learning community. If you are uncertain about if something is academic misconduct, ask me. Acts of academic misconduct may include but are not limited to cheating (working collaboratively on assignments/exams and discussion submissions, sharing answers and previewing exams) plagiarism (representing the work of others as your own without giving appropriate credit) and unauthorized collaboration (working with each other on assignments). Concerns about these or other behaviors prohibited by the Student Conduct Code will be referred for investigation and adjudication by (include information for specific campus office). Students found to have engaged in academic misconduct may receive a zero on the assignment (or other possible outcome).

Access and Accommodations: Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course.

If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or disability.uw.edu. DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

Religious Accommodations: Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at [Religious Accommodations Policy](#). Accommodations must be requested within the first two weeks of this course using the [Religious Accommodations Request form](#).