

**Math 579: Combinatorics**  
**Spring 2022**  
**Lecture Schedule**

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Below is a list of the topics we intend to cover, along with a rough schedule. Actual schedule is subject to change without notice. Last updated February 11, 2022.

Week	Topic	Chapters
1/19 – 1/21	Overview of Syllabus and Technology Introduction to Combinatorics Review Mathematical Induction	2.1–2.2
	<b>Counting and Enumeration</b>	
1/24 – 1/28	Elementary Counting Methods	3.1–3.3
	Permutations and Binomial Coefficients	
1/31 – 2/4	The Pigeon-Hole Principle	1.1–1.2
	Inclusion-Exclusion and the Sieve Formula	7.1
2/7 – 2/11	The Binomial Theorem	4.1
	Combinatorial Proofs	4.2
2/14 – 2/18	The Binomial Theorem (Deep Cuts)	
	Catalan Numbers	
*2/21 – 2/25	Compositions	5.1
	Integer Partitions	5.3
*2/28 – 3/4	Set Partitions	5.2
	<b>Generating Functions</b>	
3/7 – 3/11	Recurrence Relations	
	Introduction to Generating Functions	
3/14 – 3/18	Generating Functions for Enumeration	
	Ordinary Generating Functions	8.1
*3/21 – 3/25	Generating Functions for Enumeration (Week 2)	
	Catalan Numbers Revisited	
3/28 – 4/1	<i>Spring Break: No Classes</i>	
	<b>Graph Theory</b>	
*4/4 – 4/8	Directed and Undirected Graphs	9.1–9.3
	Hamiltonian Cycles	9.2
	Graph Isomorphisms	9.4
4/11 – 4/15	Trees	10.1
	Adjacency and Incidence Matrices	10.3
	Counting Spanning Trees	10.4
4/18 – 4/22	Bipartite Graphs	11.1–11.2
	Coloring and Matching	11.3–11.4
*4/25 – 4/29	Planar Graphs	12.1
	Dual Graphs	12.2
*5/2 – 5/5	The Sensitivity Conjecture	
	Review for Final Exam	