

Math 463/563: Graduate Algebra I

MWF 9:00am - 9:50am, HBH 423. See Syllabus for details
 Instructor: Dr. Chelsea Walton. notlaw@rice.edu

[Final Version]

Lecture #	Date	Algebraic Structure/ Broad Topic	Sub-topic (Notes in Dropbox folder)	Default: Section(s) of Dummit and Foote 3rd ed [supplementary material]	Homework Due Date Exam Date
1	M 8/25/2025	Intro/ Groups	Introduction to the course; Groups, examples of symmetries	Own notes; 1.1-1.5;	
2	W 8/27/2025	Groups	Subgroups and Group morphisms; Groups generated by subsets	1.6, 2.1; 2.3-2.5	
3	F 8/29/2025	Groups	Group Actions; Subgroups (arising from actions)	1.7; 2.2	HW #0 Due
4	W 9/3/2025 (after Labor Day)	Groups	Quotient Groups; Cosets and Lagrange's Theorem; Products of Groups	3.1; 3.2	
5	F 9/5/2025	Groups	Isomorphism Theorems; Transpositions; Alternating Groups	3.3; 3.5; 3.5, 4.6	HW #1 Due
6	M 9/8/2025	Groups	Composition Series, Hölder Program Solvable, Nilpotent Groups	3.4	
7	W 9/10/2025	Groups	Group actions via permutations; via left multiplication, Cayley's Theorem; via conjugation	4.1; 4.2; 4.3	HW #2 Due
8	F 9/12/2025	Groups	Group actions continued, Class Equation; Automorphisms	4.3; 4.4	
9	M 9/15/2025	Groups	Sylow's Theorems	4.5	
10	W 9/17/2025	Groups	Sylow's Theorems	4.5	HW #3 Due
11	F 9/19/2025	Groups	Direct Products; Fund. Thm of Fin. Gen. Abel. Grps	5.1; 5.2	
12	M 9/22/2025 (ONLINE)	Groups	Fund. Thm of Fin. Gen. Abel. Grps; Semidirect Products	5.2; 5.5	
13	W 9/24/2025 (ONLINE)	Groups	Semidirect Products	5.5	HW #4 Due
14	F 9/26/2025 (ONLINE)	Groups	p-groups; Nilpotent Groups, Solvable Groups (revisited)	6.1	
15	M 9/29/2025 (ONLINE)	Groups	Free Groups and Presentation of Groups	6.3	
16	W 10/1/2025 (ONLINE)	Rings	Rings, Examples, Subrings Ring morphisms	7.1, 7.2; 7.3	HW #5 Due
17	F 10/3/2025 (ONLINE)	Rings	Quotient Rings and Ideals	7.3, 7.4	
18	M 10/6/2025	Rings	Rings of Fractions	7.5	
19	W 10/8/2025	Rings	Euclidean Domains	8.1	
20	F 10/10/2025	Rings	Principal Ideal Domains; Unique Factorization Domains	8.2; 8.3	HW #6 Due (A heavier assignment, due on a FRIDAY)
21	W 10/15/2025 (after Midterm Recess)	Rings	Q&A - Please email questions by Tuesday 10/14 at noon. (Rings $\mathbb{Z}[\sqrt{D}]$, as time permits)	Ch 8	
22	F 10/17/2025 (IN-PERSON EXAM)				MIDTERM EXAM (through Oct 10th)
23	M 10/20/2025	Rings	Polynomial Rings over Fields	9.1, 9.2	
24	W 10/22/2025	Rings	Polynomial Rings that are UFDs Irreducibility Criterion	9.3; 9.4	HW #7 Due (This assignment will be lighter than usual.)
25	F 10/24/2025	Rings	Irreducibility Criterion Sun-tzu's Remainder Theorem; Polynomial Rings over Fields	9.4; 7.6; 9.5	
26	M 10/27/2025	Rings	Groebner Bases	9.6** **Cox-Little-O'Shea 2.1-2.3	
27	W 10/29/2025	Rings	Groebner Bases inc. Hilbert Basis Theorem	9.6** **Cox-Little-O'Shea 2.4-2.5	HW #8 Due
28	F 10/31/2025	Rings	Groebner Bases	9.6** **Cox-Little-O'Shea 2.6-2.8	
29	M 11/3/2025	Vector Spaces	Vector Spaces Vector Space morphisms Dual Vector Spaces	11.1 11.2 11.3	
30	W 11/5/2025	Vector Spaces	Bilinear and Quadratic Forms	Jacobson 2ed 6.1-6.3	HW #9 Due
31	F 11/7/2025	Vector Spaces Modules	Bilinear and Quadratic Forms Modules, Examples, Submodules	Jacobson 2ed 6.1-6.3 10.1	
32	M 11/10/2025	Modules	Modules (motivation), Examples	10.1	
33	W 11/12/2025	Modules	R-algebras, Modules morphisms, Quotient Modules	10.2	HW #10 Due
34	F 11/14/2025	Modules	Generation of Modules, Direct Sums, and Free Modules; Tensor Products of Modules (motivation)	10.3 10.4	
35	M 11/17/2025	Modules	Tensor Products of Modules	10.4	
36	W 11/19/2025	Modules	Tensor Products of Modules	10.4	HW #11 Due
37	F 11/21/2025	Modules	Linear Trans of Tens Prod of V.Spaces Modules over PID	11.2 12.1	
38	M 11/24/2025	Modules	Modules over PID Canonical Forms	12.1 12.2, 12.3	
39	M 12/1/2025 (after Thanksgiving)	Modules	Canonical Forms	12.2, 12.3	
40	W 12/3/2025	Modules	Canonical Forms	12.2, 12.3	
41	F 12/5/2025		Q&A - Please email questions by Wednesday 12/3 at noon.		HW #12 Due (due on a FRIDAY)
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Study Days	Sa 12/6/2025 - T 12/9/2025				
Final Exam	Take Home Final W Dec 10th 7pm - 10pm				FINAL EXAM (through Dec 3rd)