

Math 463/563: Graduate Algebra I
MWF 9:00am - 9:50am, 423 HBH. See Syllabus for details
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[Final Version]

Lecture #	Date	Algebraic Structure/ Broad Topic	Sub-topic (Notes in Dropbox folder)	Section(s) of Dummit and Foote 3rd edition	Section(s) of supplementary texts/ comments	Homework Due Date Exam Date
1	M 8/23/2021 (cancelled due to Covid-19 mitigation)					
2	W 8/25/2021 [ONLINE]	Intro/ Groups	Introduction to the course; Groups, examples of symmetries	Own notes; 1.1-1.5;		
3	F 8/27/2021 [ONLINE]	Groups	Subgroups and Group morphisms; Groups generated by subsets	1.6, 2.1; 2.3-2.5		HW #0 Due
4	M 8/30/2021	Groups	Group Actions; Subgroups (arising from actions)	1.7; 2.2		
5	W 9/1/2021	Groups	Quotient Groups; Cosets and Lagrange's Theorem	3.1; 3.2		HW #1 Due
6	F 9/3/2021	Groups	Isomorphism Theorems; Transpositions; Alternating Groups	3.3; 3.5; 3.5, 4.6		
7	W 9/8/2021 (after Labor Day)	Groups	Composition Series, Hölder Program Solvable, Nilpotent Groups I	3.4		HW #2 Due
8	F 9/10/2021	Groups	Group actions via permutations; via left multiplication, Cayley's Theorem; via conjugation	4.1; 4.2; 4.3		
9	M 9/13/2021	Groups	Group actions continued, Class Equation; Automorphisms	4.3; 4.4		
10	W 9/15/2021	Groups	Sylow's Theorems I	4.5		HW #3 Due
11	F 9/17/2021	Groups	Sylow's Theorems II	4.5		
12	M 9/20/2021	Groups	Direct Products; Fund. Thm of Fin. Gen. Abel. Grps	5.1; 5.2		
13	W 9/22/2021	Groups	Semidirect Products	5.5		HW #4 Due
14	F 9/24/2021	Groups	p-groups Nilpotent Groups, Solvable Groups II	6.1		
15	M 9/27/2021	Groups	Free Groups and Presentation of Groups	6.3		
16	W 9/29/2021	Rings	Rings, Examples, Subrings Ring morphisms	7.1, 7.2; 7.3		HW #5 Due
17	F 10/1/2021	Rings	Quotient Rings and Ideals	7.3, 7.4		
18	M 10/4/2021	Rings	Rings of Fractions	7.5		
19	W 10/6/2021	Rings	Euclidean Domains	8.1		HW #6 Due
20	F 10/8/2021	Rings	Principal Ideal Domains Unique Factorization Domains	8.2 8.3		
21	W 10/13/2021 (after Midterm Recess)	Rings	Polynomial Rings over Fields	9.1, 9.2		
22	F 10/15/2021					MIDTERM EXAM (through Section 8.1)
23	M 10/18/2021	Rings	Polynomial Rings that are UFDs	9.3		
24	W 10/20/2021 [NO IN-PERS. LECT., CLASS PRE-REC.] (extra OH: 4pm in-per)	Rings	Irreducibility Criterion	9.4		HW #7 Due
25	F 10/22/2021 [NO IN-PERS LECT., CLASS PRE-REC.] (extra OH: 4pm Zoom)	Rings	(Sunzi) Remainder Theorem; Polynomial Rings over Fields; Groebner Bases I	7.6; 9.5; 9.6	Using Cox-Little-O'Shea 2.1-2.3 instead of DF 9.6. The GB material be recapped on 10/25- good to see preview first.	
26	M 10/25/2021	Rings	Groebner Bases I (recap), II	9.6	Using Cox-Little-O'Shea instead, Secs 2.1 - 2.4	
27	W 10/27/2021	Rings	Groebner Bases II inc. Hilbert Basis Theorem	9.6	Using Cox-Little-O'Shea instead, Sec 2.5	HW #8 Due
28	F 10/29/2021	Rings	Groebner Bases III	9.6	Using Cox-Little-O'Shea instead, Secs 2.6 - 2.8	
29	M 11/1/2021	Vector Spaces	Vector Spaces Vector Space morphisms Dual Vector Spaces	11.1 11.2 11.3		
30	W 11/3/2021	Vector Spaces	Bilinear and Quadratic Forms	—	Jacobson 2ed 6.1-6.3	HW #9 Due
31	F 11/5/2021	Modules	Modules, Examples, Submodules	10.1		
32	M 11/8/2021	Modules	R-algebras, Modules morphisms, Quotient Modules tie to Representation Theory (brief)	10.2		
33	W 11/10/2021	Modules	Generation of Modules, Direct Sums, and Free Modules Tensor Products of Modules I	10.3 10.4		
34	F 11/12/2021	Modules	Tensor Products of Modules II	10.4	<u>Cartoon on Universal Property</u>	HW #10 Due (On 11/10 - 11/8 due FRIDAY)
35	M 11/15/2021	Modules	Tensor Products of Modules III Linear Trans of Tens Prod of V.Spaces	10.4 11.2	11.2 lecture material available via video	
36	W 11/17/2021	Modules	Modules over PID	12.1		
37	F 11/19/2021	Modules	Canonical Forms	12.2, 12.3	Axler (2015)	
38	M 11/22/2021 [NO IN-PERS LECT., CLASS PRE-REC.]	Q&A	[Submit topics, exercise suggestions to instructor by end of the day F 11/19/21]			HW #11 Due (On 11/10 - 11/15 due MONDAY)
39	M 11/29/2021	Category Theory	(Examples of) Categories Special Morphisms Duality	Ap.II	Riehl (2014) 1.1, 1.2, Mac Lane (1998) I.1 I.2, II.1	
40	W 12/1/2021	Category Theory	Functoriality Naturality	Ap.II	Riehl 1.3, 1.4 Mac Lane I.3 - I.5	
41	F 12/3/2021	Category Theory	Equivalence of Categories	Ap.II	Riehl 1.5 Mac Lane IV.4	HW #12 Due (On 11/17 - 11/22 due FRIDAY)
Study Days	Sa 12/4/2021 - T 12/7/2021					Bonus HW Due on T 12/7/2021 (11/29 - 12/3 material)
Final Exam	Option A (practice qual) F Dec 10 3pm-6pm Option B (take-home) Due Su Dec 12, 12pm					FINAL EXAM (on material thru 11/22)