

Math 463/563: Graduate Algebra I

Remote "Flipped Classroom" Format, see Syllabus for details
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[Final Version]

Lecture #	Date	Algebraic Structure/ Broad Topic	Sub-topic	Section(s) of Dummit and Foote 3rd edition	Section(s) of supplementary texts/ comments	Homework Due Date Exam Date
1	M 8/24/2020	Intro/ Groups	Introduction to the course; Groups, examples of symmetries; Subgroups and Group morphisms	Own notes; 1.1-1.5; 1.6, 2.1		
2	W 8/26/2020	Groups	Groups generated by subsets; Group Actions; Subgroups (arising from actions)	2.3-2.5; 1.7; 2.2		HW #0 due
3	F 8/28/2020	Groups	Quotient Groups; Cosets and Lagrange's Theorem	3.1; 3.2		
4	M 8/31/2020	Groups	Isomorphism Theorems; Transpositions; Alternating Groups	3.3; 3.5; 3.5, 4.6		
5	W 9/2/2020	Groups	Composition Series, Hölder Program Solvable, Nilpotent Groups I	3.4		HW #1 due
6	F 9/4/2020	Groups	Group actions via permutations and via left multiplication, Cayley's Theorem	4.1, 4.2		
7	W 9/9/2020 (after Labor Day)	Groups	Group actions via conjugation, Class Equation; Automorphisms	4.3; 4.4		HW #2 due
8	F 9/11/2020	Groups	Sylow's Theorems I	4.5		
9	M 9/14/2020	Groups	Sylow's Theorems II	4.5		
10	W 9/16/2020	Groups	Direct Products; Fund. Thm of Fin. Gen. Abel. Grps	5.1; 5.2		HW #3 due
11	F 9/18/2020	Groups	Semidirect Products	5.5		
12	M 9/21/2020	Groups	p-groups Nilpotent Groups, Solvable Groups II	6.1		
13	W 9/23/2020	Groups	Free Groups and Presentation of Groups	6.3		HW #4 due
14	F 9/25/2020	Rings	Rings, Examples, Subrings Ring morphisms	7.1, 7.2; 7.3		
15	M 9/28/2020	Rings	Quotient Rings and Ideals	7.3, 7.4		
16	W 9/30/2020	Rings	Rings of Fractions	7.5		HW #5 due
17	F 10/2/2020	Rings	Euclidean Domains	8.1		
18	M 10/5/2020	Rings	Principal Ideal Domains Unique Factorization Domains	8.2 8.3		
19	W 10/7/2020	Rings	Polynomial Rings over Fields	9.1, 9.2		HW #6 due
20	F 10/9/2020	Rings	Polynomial Rings that are UFDs	9.3		
21	M 10/12/2020	Rings	Irreducibility Criterion	9.4		
22	W 10/14/2020	(no discussion today)				MIDTERM EXAM (through Section 9.3)
23	F 10/16/2020	Rings	(Sunzi) Remainder Theorem; Polynomial Rings over Fields	7.6; 9.5		
24	M 10/19/2020	Rings	Groebner Bases I	9.6	Using Cox-Little-O'Shea instead, Secs 2.1 - 2.3	
25	W 10/21/2020	Rings	Groebner Bases II	9.6	Using Cox-Little-O'Shea instead, Secs 2.4 - 2.5	HW #7 due
26	F 10/23/2020	Rings	Groebner Bases III	9.6	Using Cox-Little-O'Shea instead, Secs 2.6 - 2.8	
27	M 10/26/2020	Vector Spaces	Vector Spaces Matrix of Vector Space morphisms Dual Vector Spaces	11.1 11.2 11.3		
28	W 10/28/2020	Modules	Modules, Examples, Submodules	10.1		HW #8 due
29	F 10/30/2020	Modules	R-algebras, Modules morphisms, Quotient Modules	10.2		
30	M 11/2/2020	Modules	Generation of Modules, Direct Sums, and Free Modules I	10.3		
31	W 11/4/2020	Modules	Generation of Modules, Direct Sums, and Free Modules II Tensor Products of Modules I	10.3 10.4		HW #9 due (with extension by request)
32	F 11/6/2020	Modules	Tensor Products of Modules II	10.4		
33	M 11/9/2020	Modules	Tensor Products of Modules III Modules over PID I	11.2 12.1		
34	W 11/11/2020	Modules	Modules over PID II	12.1		HW #10 due (with extension by request)
35	F 11/13/2020	Modules	Canonical Forms	12.2, 12.3	Axler (2015)	
36	M 11/16/2020	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	
37	W 11/18/2020	Category Theory	Functoriality Naturality	Ap.II	Riehl 1.3, 1.4 Mac Lane I.3 - I.5	
38	F 11/20/2020	Category Theory	Equivalence of Categories including many examples	Ap.II	Riehl 1.5 Mac Lane IV.4	HW #11 due
39	Independent Study Period...					
40	...M 11/30/2020 to F 12/4/2020...					
41	...items due 12/4/2020					Bonus HW on Category Theory due on Dec 4th
42						
Study Days	Sa 12/5/2020 - T 12/8/2020					
Final Exam	W 12/9/2020 (3 hrs) two time slots 8-11am, 2-5pm (email CW w/ choice)					FINAL EXAM (on material thru 11/13)