

Math 374: Intro to Representation Theory

MWF 10:00am - 10:50am, 453 HBH. See Syllabus for details  
Instructor: Dr. Chelsea Walton. notlaw@rice.edu

[Final version]

Lecture #	Date	Topic (Notes in Dropbox folder)	Accompanying Section of James and Liebeck	Accompanying Section of Sagan	Other references	Homework Due Date Expo. Paper Due Dates
1	M 1/10/2022 [ONLINE]	Introduction to Course Review of Groups	Chapter 1	—	Walton's 2021 NAM-JMM talk + accomp. article	
2	W 1/12/2022 [ONLINE]	Review of Groups	Chapter 1	Section 1.1		<b>HW 0 Due</b> (does not count for credit)
3	F 1/14/2022 [ONLINE]	Linear Algebra Review	Chapter 2	—		
4	W 1/19/2022 (after MLK break) [ONLINE]	Linear Algebra Review	Chapter 2	—		<b>HW 1 Due</b>
5	F 1/21/2022 [ONLINE]	Group Representations	Chapter 3	Section 1.2		
6	M 1/24/2022 [ONLINE]	Group Representations FG-modules	Chapter 3 Chapter 4	Section 1.3		
7	W 1/26/2022 [ONLINE]	More on FG-modules	Chapter 4	Section 1.3		<b>HW 2 Due</b>
8	F 1/28/2022 [ONLINE]	FG-submodules Irreducible FG-modules	Chapter 5	Section 1.4		
9	M 1/31/2022	Group Algebras	Chapter 6	—		
10	W 2/2/2022	FG-homomorphisms	Chapter 7	Sections 1.5, 1.6		<b>HW 3 Due</b>
11	F 2/4/2022 [ONLINE]	Direct sum of FG-modules Maschke's Theorem	Chapter 7 Chapter 8	Section 1.5		
12	M 2/7/2022	Maschke's Theorem	Chapter 8	Sections 1.5		
13	W 2/9/2022	Schur's Lemma and Representations of finite abelian groups	Chapter 9	Section 1.6		<b>HW 4 Due</b>
14	M 2/14/2022 (after Spring Recess)	More consequences of Schur's Lemma Irreducibility	Chapter 9 Chapter 10	Section 1.6 —		
15	W 2/16/2022	More on the group algebra	Chapter 11	—		<b>HW 5 Due</b>
16	F 2/18/2022	More on the group algebra Interlude: ADE classification/ McKay Correspondence	Chapter 11 —	—	(instructor notes; various sources)	
17	M 2/21/2022	Conjugacy Classes	Chapter 12	Section 1.8		
18	W 2/23/2022	Conjugacy Classes Characters	Chapter 12 Chapter 13	Section 1.8		<b>HW 6 Due</b>
19	F 2/25/2022	Characters	Chapter 13	Section 1.8		
20	M 2/27/2022	Inner Product of Characters	Chapter 14	Section 1.9		
21	W 3/2/2022	Inner Product of Characters	Chapter 14	Section 1.9		<b>HW 7 Due</b>
22	F 3/4/2022	The Number of Irreducible Characters	Chapter 15	Section 1.10		
23	M 3/7/2022	Character Table and Orthogonality Relations Tensor Products	Chapter 16 Chapter 19	Section 1.10 Section 1.7, 1.11		
24	W 3/9/2022	Tensor Products	Chapter 19	Section 1.7, 1.11		<b>HW 8 Due</b>
25	F 3/11/2022	Tensor Products	Chapter 19	Section 1.7, 1.11		<b>Expo. Paper Outline Due</b> (0.5 - 2 page .tex)
26	M 3/21/2022 (after Spring Break)	Recap of Material Restriction to a Subgroup	Chapter 20	Section 1.12	(instructor notes)	
27	W 3/23/2022	Restriction to a Subgroup Clifford's Theorem	Chapter 20	Section 1.12		<b>HW 9 Due</b>
28	F 3/25/2022	Induced Modules and Characters	Chapter 21	Section 1.12		
29	M 3/28/2022	Induced Modules and Characters The Frobenius Reciprocity Theorem	Chapter 21	Section 1.12		
30	W 3/30/2022	The Frobenius Reciprocity Theorem Applications	Chapter 21	Section 1.12		<b>HW 10 Due</b>
31	F 4/1/2022	Categories and Functors (Bonus material - on Bonus HW, not on req. HW)	—	—	(instructor notes)	<b>Draft of Expo. Paper Due</b> (at least 3.5 pages tex)
32	M 4/4/2022 (Instr - out of town) [PRE-RECORDED]	Adjunction and Frobenius Reciprocity upgraded (Bonus material - on Bonus HW, not on req. HW)	—	—	(instructor notes)	
33	W 4/6/2022 (Instr - out of town) [ONLINE-LIVE]	Representations of Symmetric Groups: Outline, Multiplicity-Freeness Theorem	—	—	Lorenz 4.1, 4.2	<b>HW 11 Due</b>
34	F 4/8/2022 (Instr - out of town) [PRE-RECORDED]	Representations of Symmetric Groups: Multiplicity-Freeness Thm, Branching Graph	—	Section 2.8	Lorenz 4.1, 4.2	
35	M 4/11/2022	Representations of Symmetric Groups: Branching Graph examples	—	Section 2.8	Lorenz 4.2	
36	W 4/13/2022	Representations of Symmetric Groups: Young Graph	—	Sections 2.1-2.3, 2.5, 2.7	Lorenz 4.3	
37	F 4/15/2022	Representations of Symmetric Groups: Young Graph examples	—	Sections 2.1-2.3, 2.5, 2.7	Lorenz 4.3	<b>HW 12 Due</b>
38	M 4/18/2022	Representations of Symmetric Groups: Connection btw Branching and Young graph (sketch)	—	—	Lorenz 4.4	
39	W 4/20/2022	Representations of Symmetric Groups: Summary and Examples	—	—	Lorenz 4.1 - 4.4	<b>Bonus HW Due</b>
40	F 4/22/2022	(No class - wrap material on April 20th)	—	—		<b>Final Version</b> <b>of Expo. Paper Due</b> <b>(7 - 10 pages tex, incl. refs)</b>
Study Days	Sa 4/23/2021 - T 4/26/2021	n/a				
Final Exam		n/a				