

Math 466/566: Topics in Algebra II, on CW's book "Symmetries of Algebras, Volume 1"

9:25am - 10:40am, HBH 453. See Syllabus for details
 Instructor: Dr. Chelsea Walton. notlaw@rice.edu

Lecture #	Date	Broad Topic	Sub-topic (Notes in Dropbox folder)	Section(s) of Walton's text [see references within for supplementary material]	Optional Homework Problems & Due Dates (*) 3 point problem (**) 4 point problem (***) 5 point problem
1	Tues Jan 9, 2024	Introduction Algebras over a Field	Intro to Course Groups, Rings, and Vector Spaces	1.1.1 - 1.1.4	1.1*, 1.4**
2	Thurs Jan 11, 2024	Algebras over a Field	Univ. Prop., Construction of V. Spaces Algebras Examples of Algebras	1.1.4 1.1.5 1.2.1-1.2.4	1.2*, 1.3**, 1.5*, 1.6*, 1.7*
3	Tues Jan 16, 2024	Algebras over a Field	Examples of Algebras Representations and modules	1.2.5-1.2.6, read 1.2.7 1.3	1.8**, 1.9*, 1.10*, 1.11**, 1.12*, 1.13**, 1.14**
4	Thurs Jan 18, 2024	Algebras over a Field	Operations on algebras and modules	1.4	1.15***, 1.16*, 1.17**, 1.18**, 1.19**, 1.20*, 1.21*, 1.22*, 1.23*, 1.24**, 1.25**, 1.26**, 1.27**, 1.28**
5	Tues Jan 23, 2024	Algebras over a Field	Simple, Semisimple, and Separable Algebras	1.5 - 1.7	1.29**, 1.30*, 1.31*, 1.32**, 1.33**, 1.34**, 1.35**
6	Thurs Jan 25, 2024	Categories	Categories Universal objects and morphisms	2.1 2.2.1	2.1*, 2.2**, 2.3*, 2.4*, 2.5*, 2.6*, 2.7*
7	Tues Jan 30, 2024	Categories	Universal objects and morphisms Abelian categories	2.2.1 2.2.2	2.8**, 2.9**, 2.10**, 2.11**, 2.12**, 2.13**, 2.14*, 2.15*, 2.16**, 2.17*, 2.18**
8	Thurs Feb 1, 2024	Categories	Functors and Natural Transformations	2.3	Chap 1 Problems due at 9:00AM, Gradescope 2.19**, 2.20***, 2.21**, 2.22***, 2.23**, 2.24*, 2.25*, 2.26*, 2.27***
9	Tues Feb 6, 2024	Categories	Isomorphisms and Equivalence Morita equivalence	2.4	2.28*, 2.29*, 2.30*, 2.31**, 2.32**, 2.33**, 2.34**, 2.35**, 2.36***, 2.37*, 2.38****(6pts), 2.39**
10	Tues Feb 13, 2024	Categories	Adjunction and Representable Functors	2.5 - 2.6	2.40**, 2.41**, 2.42**, 2.43**, 2.44*, 2.45**, 2.46*, 2.47*, 2.48**
11	Thurs Feb 15, 2024	Categories	(Selection of) Simplicity, Semisimplicity, Homological Algebra, and Finiteness	2.7 - 2.9	2.49**, 2.50*, 2.51**, 2.52**
12	Tues Feb 20, 2024	Monoidal Categories	Monoidal categories Monoidal functors	3.1 3.2.1	3.1*, 3.2*, 3.3*, 3.4*, 3.7*, 3.8*
13	Thurs Feb 22, 2024	Monoidal Categories	Monoidal isomorphism, Monoidal equivalence, (Bi)Module categories	3.2.2, 3.2.3 3.3	3.5**, 3.6**, 3.9*, 3.10*, 3.11**, 3.12**, 3.13*, 3.14**
14	Tues Feb 27, 2024	Monoidal Categories	Strictness and coherence, and graphical calculus	3.4 3.5	Chap 2 Problems due at 9:00AM, email 3.15**, 3.16***, 3.17*
15	Thurs Feb 29, 2024	Monoidal Categories	Rigidity, pivotality (skipping sphericity)	3.6, 3.7 (3.8)	3.18*, 3.19*, 3.20*, 3.21*, 3.22**, 3.23**, 3.24**, 3.25**, 3.26**, 3.27**, 3.28**, 3.29**, 3.30*, 3.31**, 3.32*
16	Tues Mar 5, 2024	Monoidal Categories	Fusion categories	3.9	3.33**, 3.34**, 3.35****(6pts), 3.36***, 3.37**, 3.38***
17	Thurs Mar 7, 2024	Monoidal Categories	Tensor categories Enriched categories	3.10 3.11	3.39**, 3.40**, 3.41*, 3.42**
18	Tues Mar 19, 2024	Algebras in Monoidal Categories	Algebras, subalgs, quotient algebras, Doctrinal adjunction	4.1.1, 4.2 4.3.1 (skipping 4.1.2, 4.1.3)	4.1**, 4.2*, 4.3*, 4.4**, 4.5*, 4.6*, 4.7**, 4.8**, 4.9**, 4.10***, 4.11**, 4.12*, 4.13**, 4.14*, 4.15**, 4.16***, 4.17**, 4.18**, 4.19**
19	Thurs Mar 21, 2024	Algebras in Monoidal Categories	Modules, bimodules Monads and EM categories	4.4.1, 4.4.2 4.3.2, 4.4.3	4.20**, 4.21**, 4.22**, 4.23**, 4.24**, 4.25**, 4.26**, 4.27**, 4.28*, 4.29**, 4.30**, 4.31**, 4.32**, 4.33**, 4.34**, 4.35**
20	Tues Mar 26, 2024	Algebras in Monoidal Categories	Algebraic operations Generalized Eilenberg-Watts Theorem Generalized Morita's Theorem	4.5 4.7 (skipping 4.6)	Chap 3 Problems due at 9:00AM, email (all **) 4.36, 4.37, 4.38, 4.39, 4.40, 4.41, 4.42, 4.43, 4.44, 4.45, 4.46, 4.47, 4.48, 4.49, 4.50
21	Thurs Mar 28, 2024	Algebras in Monoidal Categories	Internal Homs and Ends Ostrik's Theorem	4.8	(all **) 4.51, 4.52, 4.53, 4.54, 4.55, 4.56, 4.57
22	Tues Apr 2, 2024	Algebras in Monoidal Categories	Properties of algebras Categories of bimodules Categorical Morita equivalence	4.9, 4.10.1, 4.10.2 (skipping 4.10.3)	4.58**, 4.59**, 4.60***, 4.61***, 4.62**, 4.63***, 4.64***
23	Thurs Apr 4, 2024	Coalgebras	Coalgebras over Fields, and Coalgebras in Monoidal Categories	Instructor's Notes	5.1*, 5.2**, 5.3*, 5.4*, 5.5**, 5.6**, 5.7**, 5.8**
24	Tues Apr 9, 2024	Frobenius algebras	Frobenius algebras over Fields, and Frobenius algebras in Monoidal Categories	Instructor's Notes	5.9*, 5.10**, 5.11**, 5.12** 5.13**, 5.14**, 5.15**, 5.16**
25	Thurs Apr 11, 2024	Bialgebras	Bialgebras and Hopf algebras over Fields	Instructor's Notes	Chap 4 Problems due at 9:00AM, email 5.17*, 5.18**, 5.19**, 5.20** 5.21**, 5.22*, 5.23***, 5.24**
26	Tues Apr 16, 2024	Braided categories	Braided categories, Ribbon Categories Modular categories	Instructor's Notes	5.25**, 5.26**, 5.27**, 5.28**, 5.29**
27	Thurs Apr 18, 2024	Higher Structures	Various 2-structures, etc.	Instructor's Notes	(None)
—	Fri Apr 19, 2024				Problems post Chapter 4 due at 8:00PM, email