18.702 SUBJECT OUTLINE

Group Representations

Wednesday, February 6: group representations, Ch 10, Sec 1,4
   Exercises: Ch 10, 1.1, 1.2
Friday, February 8: unitary representations, Ch 10, Sec 2,3
   Exercises: Ch 10, 2.1, 3.2, 3.4
Monday, February 11 characters, Ch 10, Sec 4,5
   Exercises: Ch 10, 4.1, 4.3b,e, 4.8, 5.1, 5.3
Wednesday, February 13: the regular representation, Ch 10, Sec 6
   Exercises: Ch 10, 5.4, 6.1, 6.3
Friday, February 15: Schur’s Lemma, Ch 10, Sec 7
   Exercises: Ch 10, 7.1, 7.2

Monday, February 20: President’s Day, Holiday

Tuesday, February 19: proof of the orthogonality relations, Ch 10, Sec 8
   Exercises: Ch 10, 7.4, 7.6
Wednesday, February 20: representations of $SU_2$ (if time permits), Ch 10, Sec 9
   Exercises: Ch 10, 8.1, 8.2, 8.5

Rings

Friday, February 22: rings, ring homomorphisms, Ch 11, Sec 1,2,3
   Exercises: Ch 11, 1.1, 1.5, 1.8, 1.9
Monday, February 25: ideals, quotient rings, correspondence theorem, Ch 11, Sec 4,5
   Exercises: Ch 11, 3.12, 3.13, 4.1, 4.2
Wednesday, Friday, 27: maximal ideals, prime ideals, fractions, Ch 11, Sec 8,9
   Exercises: Ch 11, 6.1, 7.1, 8.3

Factoring

Friday, March 1: Gauss’ Lemma, Ch 12, Sec 3
   Exercises: Ch 12, 2.3, 2.7, 3.2

Monday, March 4: First Quiz
Wednesday, March 6: *unique factorization*, Ch 12, Sec 1,2
   Exercises:   Ch 12, 1.1, 1.5, 2.1, 2.2

Friday, March 8: *factoring integer polynomials*, Ch 12, Sec 4
   Exercises:   Ch 12, 4.1a, 4.6, 4.7, 4.11

   **Quadratic Imaginary Integers**

Monday, March 11: *Gauss primes*, Ch 12, Sec 5
   Exercises:   Ch 12, 5.1, 5.2b, 5.3

Wednesday, March 13: *quadratic integers*, Ch 13, Sec 1
   Exercises:   Ch 13, 1.1, 1.2, 1.3a,c

Friday, March 15: *factoring ideals*, Ch 13 Sec 2,3
   Exercises:   Ch 13, 2.1, 3.1, 3.2, 3.3

Monday, March 18: *prime ideals*, Ch 13, Sec 5,6
   Exercises:   Ch 13, 5.3, 6.1, 6.2

Wednesday, March 20: *ideal classes*, Ch 11, Sec 9,10
   Exercises:   Ch 13, 7.1, 7.2, 8.2

   **Linear Algebra over a Ring**

Friday, March 22: *integer matrices*, Ch 14, Sec 1, 2
   Exercises:   Ch 14, 1.1, 2.1, 2.4

Monday, March 27 - Friday, March 31: **Spring Vacation.**

Monday, April 1: *free modules*, Ch 14, Sec 3, 4
   Exercises:   Ch 14, 3.2, 4.1a, 4.3

Wednesday, April 3: *presenting modules*, Ch 12, Sec 5
   Exercises:   Ch 14, 5.1, 5.2

Friday, April 5: *Hilbert Basis Theorem*, Ch 14, Sec 6
   Exercises:   Ch 11, 6.1, 6.2, M.1

Monday, April 8: *structure of abelian groups*, Ch 14, Sec 7
   Exercises:   Ch 14, 7.1, 7.2, 7.5

Wednesday, April 10: **Second Quiz**
Field Extensions

Friday, April 12: *algebraic elements, degree*, Ch 15, Sec 1.2
  Exercises: Ch 15, 1.1, 1.3, 2.1

Monday, April 15: **Patriot’s Day, Holiday**

Wednesday, April 17: *ruler and compass*, Ch 13, Sec 5
  Exercises: Ch 15, 5.1, 5.2

Friday, April 19: *adjoining elements*, Ch 11, Sec 5, Ch 15, Sec 6
  Exercises: Ch 11, 5.3, Ch 15, 6.1, 6.3

Monday, April 22: *finite fields*, Ch 15, Sec 7
  Exercises: Ch 15, 7.1, 7.2, 7.13

Wednesday, April 24: *primitive elements*, Ch 15, Sec 8
  Exercises: Ch 15, 8.1, 8.2

Friday, April 26: *symmetric functions, discriminant*, Ch 16 Sec 1,2
  Exercises: Ch 16, 1.1a,b,e, 2.1, 2.2

Galois Theory

Monday, April 29: *splitting fields, the Galois group*, Ch 16, Sec 3,4
  Exercises: Ch 16, 3.2, 4.1

Wednesday, May 1: *fixed fields, Galois extensions*, Ch 16, Sec 5,6
  Exercises: Ch 16, 5.1b,c, 6.1

Friday, May 3: *the main theorem*, Ch 16, Sec 7
  Exercises: Ch 16, 7.1, 7.3, 7.6, 7.7

Monday, May 6: *cubic equations*, Ch 16, Sec 8
  Exercises: Ch 16, 8.2a,b,c

Wednesday, May 8: *quartic equations*, Ch 16, Sec 9
  Exercises: Ch 16, 9.1, 9.6, 9.12a,b

Friday, May 10: **Third Quiz**

Monday, May 13: *roots of unity*, Ch 16, Sec 10,11
  Exercises: Ch 16, 10.1, 10.3, 11.1

Wednesday, May 15: *quintic equations*, Ch 16, Sec 12
  Exercises: Ch 16, 12.1, 12.2, 12.7