MA 383: Introduction to Modern Algebra Itinerary

Dylan C. Beck

Fall 2022

Wednesday, August 17 (Week 1)

Review of Set Operations and the Basics of Logic
Quiz: Set Operations and the Basics of Logic

Friday, August 19

The Principle of Mathematical Induction and the Division Algorithm
Quiz: Set Operations and the Basics of Logic

Monday, August 22 (Week 2)

The Integers Modulo n and Rigid Motions
Quiz: the Principle of Mathematical Induction and the Division Algorithm

Group Theory

Wednesday, August 24

Groups (Definitions and Examples)
Quiz: the Integers Modulo n and Rigid Motions

Friday, August 26

Groups (Basic Properties and Subgroups)
Quiz: Groups (Definitions and Examples)

Monday, August 29 (Week 3)

Cyclic Groups
Quiz: Groups (Basic Properties and Subgroups)

Wednesday, September 1

Complex Numbers as a Group Under Multiplication
Quiz: Cyclic Groups

Friday, September 2

The Symmetric Group on n Letters
Quiz: Complex Numbers as a Group Under Multiplication

Monday, September 5 (Week 4)

Labor Day

Wednesday, September 7

Dihedral Groups
Quiz: the Symmetric Group on n Letters

Friday, September 9

Cosets and Lagrange's Theorem
Quiz: Dihedral Groups

Monday, September 12 (Week 5)

Quotient Groups and Normal Subgroups
Quiz: Cosets and Lagrange's Theorem

Wednesday, September 14

Group Homomorphisms and Cayley's Theorem
Quiz: Quotient Groups and Normal Subgroups

Friday, September 16

The Group Isomorphism Theorems
Quiz: Group Homomorphisms and Cayley's Theorem

Monday, September 19 (Week 6)

External and Internal Direct Products
Quiz: the Group Isomorphism Theorems

Wednesday, September 21

Finite Abelian Groups
Quiz: External and Internal Direct Products

Friday, September 23

Finitely Generated Abelian Groups and the Smith Normal Form
Quiz: Finite Abelian Groups

Monday, September 26 (Week 7)

Group Actions and the Class Equation
Quiz: Finitely Generated Abelian Groups and the Smith Normal Form

Wednesday, September 28

Sylow's Theorems
Quiz: Group Actions and the Class Equation

Friday, September 30

Sylow's Theorems (Applications)
Quiz: Sylow's Theorems

Monday, October 3 (Week 8)

Exam I Review
Quiz: Sylow's Theorems (Applications)

Wednesday, October 5

Exam I

Friday, October 7

Fall Break

Ring Theory

Monday, October 10 (Week 9)

Rings, Ring Homomorphisms, Ideals, and Quotient Rings

Wednesday, October 12

The Ring Isomorphism Theorems
Quiz: Rings, Ring Homomorphisms, Ideals, and Quotient Rings

Friday, October 14

Integral Domains, Fields, and Prime and Maximal Ideals
Quiz: the Ring Isomorphism Theorems

Monday, October 17 (Week 10)

The Chinese Remainder Theorem
Quiz: Integral Domains, Fields, and Prime and Maximal Ideals

Wednesday, October 19

Extension, Contraction, and Oka Families
Quiz: the Chinese Remainder Theorem

Friday, October 21

Polynomial Rings and Polynomial Long Division
Quiz: Extension, Contraction, and Oka Families

Monday, October 24 (Week 11)

Irreducibility of Polynomials
Quiz: Polynomial Rings and Polynomial Long Division

Wednesday, October 26

Euclidean Domains
Quiz: Irreducibility of Polynomials

Friday, October 28

Principal Ideal Domains (PIDs)
Quiz: Euclidean Domains

Monday, October 31 (Week 12)

Unique Factorization Domains (UFDs)
Quiz: Principal Ideal Domains (PIDs)

Wednesday, November 2

Polynomial Rings over UFDs
Quiz: Unique Factorization Domains (UFDs)

Friday, November 4

Fields of Fractions and Localization
Quiz: Unique Factorization Domains (UFDs)

Monday, November 7 (Week 13)

Exam II Review
Quiz: Fields of Fractions and Localization

Wednesday, November 9

Exam II

Field Theory

Friday, November 11

Roots of Polynomials and Field Extensions

Monday, November 14 (Week 14)

Finite Extensions
Quiz: Roots of Polynomials and Field Extensions

Wednesday, November 16

Splitting Fields of Polynomials and Algebraic Closure
Quiz: Finite Extensions

Friday, November 18

Finite Fields
Quiz: Splitting Fields of Polynomials and Algebraic Closure

Monday, November 21 (Week 15)

Separable Extensions
Quiz: Finite Fields

Wednesday, November 23

Thanksgiving Break

Friday, November 25

Thanksgiving Break

Monday, November 28 (Week 16)

Field Automorphisms
Quiz: Separable Extensions

Wednesday, November 30

The Galois Group
Quiz: Field Automorphisms

Friday, December 2

The Fundamental Theorem of Galois
Quiz: the Galois Group