

Math 4000/6000: Introduction to Modern Algebra and Geometry  
Fall 2003

Instructor: Daniel K. Nakano

Office: Boyd Graduate Center, Room 445

Phone: 542-2643

Office Hours: MWF 1:00-2:00

Text: Fraleigh, A First Course in Abstract Algebra, seventh ed.

COURSE SCHEDULE

Week 1: 8/18-8/22

0, I.1	Sets, Equivalence Relations, Number Systems, Induction Complex Numbers	0: 4,11,16,25 I.1: 5,8,18,23,33,41
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Week 2: 8/25-8/29

I.2-4	Binary Operations, Isomorphism, Groups	I.2: 3,4,10,26,27,28 I.3: 2,4,16,26,27 I.4: 2,15,32,25,41
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Week 3: 9/3-9/5

I.5-6	Subgroups, Cyclic Groups	I.5: 1,3,15,46,51,54 I.6: 1,5,17,26,45,55
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Week 4: 9/8-9/12

II.8-9	Permutation Groups, Orbits, Cycles, Alternating Group	II.8: 1,3,16,35,46,52 II.9: 2,10,23,29,31,34
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Week 5: 9/15-9/19

II.10-11	Cosets, LaGrange's Theorem Direct Products, Finitely Generated Abelian Groups	II.10: 3,26,34,39,40 II.11: 3,10,26,46,47,52
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Week 6: 9/22-9/26

Review, MIDTERM (covers Ch I-II),

Typeset by  $\mathcal{A}\mathcal{M}\mathcal{S}$ -TEX

Week 7: 9/29-10/3

III.13-14

Homomorphism, Factor Groups

III.13: 8,32,45,49,51

III.14: 10,23,24,30,34,38

Week 8: 10/6-10/10

IV.18-19

Rings and Fields  
Integral Domains

IV.18: 4,19,20,23,41,46,47

IV.19: 5,14,21,22,29

Week 9: 10/13-10/17

IV.20-21

Fermat's and Euler's Theorem,  
Field of Quotients

IV.20: 1,4,7,10,13,27,29

IV.21: 1,4,5

Week 10: 10/20-10/24

IV.22-23

Rings of Polynomials,  
Factorization of Polynomials,  
Eisenstein Criterion

IV.22: 1,10,14,21,24,27

IV.23: 1,9,19,27,34,35

Week 11: 10/27-10/29

Review, MIDTERM (covers III-IV)

Week 12: 11/3-11/7

V.26-27

Homomorphisms, Factor Rings,  
Prime and Maximal Ideals

V.26: 1,10,19,24,26,30

V.27: 4,6,16,30,31,34

Week 13: 11/10-11/14

VI.29-30

Introduction to Extension Fields,  
Vector Spaces

VI.29: 1,4,23,29,30,31

VI.30: 5,8,22,23,25

Week 14: 11/17-11/21

VII.31-32

Algebraic Extensions,  
Geometric Constructions

VII.31: 1,2,19,22,23,24,30,34,37

VII.32: 2,3,4,9

Week 15: 11/24

Additional Topics

Week 16-17: 12/1-12/8

Additional Topics, Review

Final: Friday, December 12, 2003, 8:00-11:00am

### Grading Policy

Final: 40%

Midterms: 20%

Homework: 20%

### Remarks:

- 1) In this class we will emphasize some theoretical aspects of mathematics. You will be expected to learn definitions, theorems as well as proofs. As a general rule you might have to put in twice as many hours outside of class in order to learn the material. We will try to develop most of the theory in a rigorous fashion.
- 2) I highly recommend that you read your book before coming to class. You will probably not understand everything the author says, but it will help you to keep up during the lectures. Success in this class will depend on your ability to read outside of class.
- 3) Homework for the previous week is due on the following Friday.