

SUMMER 2009: ALGEBRA
JUNE 15 - JULY 31

RYAN E GRADY

This course will be a seven week intensive introduction to abstract algebra. The goal of this short-course is to prepare students for graduate study in algebra. The proposed format is two 45 minute lectures separated by a 15 minute break each weekday (beginning at 9:30 am). Two days each week one of the lectures will be replaced by a problem solving/homework session. Homework will be assigned daily. Further, I will make myself available for one hour each afternoon (3-4 pm).

The final week of the course will be focused on individual projects (note that work on these projects will begin earlier). Each student will be expected to write a short paper and prepare a talk for their peers (see Prof. Connolly's emails). Students should pick a topic by the end of the fourth week of the course. Professor Connolly will help mentor these individual projects.

SCHEDULE

Date	Section	Topic
Monday 6/15	2.1-2.2	Groups and subgroups
Tuesday 6/16	2.3-2.4	Homomorphisms and isomorphisms
Wednesday 6/17	2.6	Cosets
Thursday 6/18	2.7-2.8	More subgroups and products
Friday 6/19	2.9	$\mathbb{Z}/n\mathbb{Z}$
Monday 6/22	2.10	Quotient groups
Tuesday 6/23	2.10 + suppl.	The isomorphism theorems
Wednesday 6/24	5.3	Symmetry: dihedral and icosahedral groups
Thursday 6/25	6.1-6.2	Groups acting on themselves: the class equation
Friday 6/26		Make up day
Monday 6/29	6.4	The Sylow theorems
Tuesday 6/30	6.4-6.5	Sylow and groups of order 12
Wednesday 7/1	6.6	More on S_n
Thursday 7/2	10.1	Introduction to rings
Friday 7/3	10.3	Homomorphisms and ideals
Monday 7/6	10.3	Homomorphisms and ideals continued
Tuesday 7/7	10.4	Quotient rings
Wednesday 7/8	10.5	Adjunction of an element: \mathbb{C} from \mathbb{R}
Thursday 7/9	10.6	Integral domains
Friday 7/10		Make up day

Monday 7/13	11.1	Introduction to factorization
Tuesday 7/14	11.2	Domains, domains, domains
Wednesday 7/15	11.2	Domains continued
Thursday 7/16	11.3	Gauss' Lemma
Friday 7/17	11.3	Gauss' Lemma continued
Monday 7/20	11.4	Eisenstein Criterion
Tuesday 7/21	11.4	Eisenstein Criterion continued
Wednesday 7/22	11.5	Primes in the Gaussian integers
Thursday 7/23		Make up day
Friday 7/24		Make up day
Monday 7/27		Start Projects
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Friday 7/31		Presentations

REFERENCES

- [1] M Artin, *Algebra*, Prentice Hall: New Jersey, 2001.