

Syllabus Math 553, Spring 2013

Meeting time and place : MWF 12.30-1.20, REC 113

Instructor: Saugata Basu

Office: Math 742

email: *sbasu@math.purdue.edu*

url: <http://www.math.purdue.edu/~sbasu/>

Office hours: Wed 2-3 or by appointment.

Grader: Manish Mishra

Grader's email: *mmishra@math.purdue.edu*

Pre-requisites: Basic group theory, definitions and basic properties of rings, fields and vector spaces.

Topics to be covered (some familiarity will be assumed about the topics marked in italics):

1. Group theory: *Groups, sub-groups, isomorphism theorems*, Sylow theory, direct and semi-direct products, classification of groups of small order, *symmetric and alternating groups*, groups actions, orbits and stabilizers, conjugacy classes, nilpotent and solvable groups, free groups, some basic categorical definitions. (Chapters 1-4, parts of Chapters 5 and 6).
2. Ring theory: *Rings, ideals and quotient rings*, commutative rings, euclidean domains, principal ideal domains, unique factorization domains, modules over commutative rings. (Chapters 7-8 and parts of Chapters 9 and 10).
3. Fields: Field extension, algebraic and transcendental extensions, Galois extensions, splitting fields, algebraic closure, separable and inseparable extensions, finite fields, fundamental theorem of Galois theory, insolvability of the general quintic in terms of radicals and other applications. (Chapters 13 and 14).

Textbooks: The textbook is *Abstract Algebra* by Dummit and Foote. Other useful references:

1. *Algebra* Bourbaki, Chapters 1-3

2. *Algebra* M. Artin.

3. *Algebra* S. Lang.

There will be weekly homeworks, three mid-terms and a final exam. The weekly homeworks will be posted on the course website. The grade distribution will be as follows:

- i. homework: 25%
- ii. mid-terms: $15+15+15 = 45\%$
- iii. final exam: 30%

Exam dates (subject to change):

- i. Mid-term 1: Feb 4 (Mon).
- ii. Mid-term 2: Mar 4 (Mon).
- iii. Mid-term 3: April 2 (Mon).
- iv. Final Exam: (TBA).