

MTH204 2021-2022 (SEMESTER II); FCH

INSTRUCTOR: SANTOSH NADIMPALLI

In this course, we will study Groups, Rings and their modules, then some Galois theory. At the end of the course each student must understand the proof of the fact that the roots of a quintic polynomial cannot be obtained by taking successive roots of its coefficients.

- (1) Regular solids and their symmetries
- (2) Definition of group, homomorphisms, normal subgroups.
- (3) Abelian groups, Symmetric groups, alternating groups, linear groups.
- (4) Group actions, application to class number formula
- (5) Solvable groups and nilpotent groups p -groups
- (6) Sylow's theorems.
- (7) Some classification results of finite groups.
- (8) Groups and linear actions. The (p, q) theorem of Burnside.
- (9) Rings and some review of factorisation in abstract rings.
- (10) Examples of euclidean, principal ideal, unique factorisation domains.
- (11) Modules and finitely generated modules over a PID.
- (12) Some geometric and function theoretic examples.
- (13) Review of fields
- (14) Field automorphisms and fixed fields.
- (15) Main theorem of Galois theory
- (16) Solvability of Galois group and the solvability of polynomial equations in terms of radicals.
- (17) Compass and straight edge constructions.

Live lectures will be given via zoom link Tuesday, Wednesday and Friday, from 11Am to 12 PM. After the first lecture, we will see the modified timetable. I will upload these recording on Mookit platform. Zoom link will be posted on the official Mookit webpage of the course.

Tutorial will be taken every Thursday, from 11 AM to 12 PM, via the same Zoom link. I will assign some problems before hand to be discussed during tutorial session.

Grading will be based on midsem and endsem exams only. Midsem will consist of forty percent weightage and endsem the rest of it. Midsem will be a take home exam, ideally you will have a day to submit your answers. Duration of Endsem exam is 3 hours.

About letter grades, A^* is reserved for outstanding performance in the course, I reserve the right to give this grade based on overall performance: in exams, during tutorial sessions and active participation during the course. All other grades are based on exam scores only. The grade A will be given for top 10 percentage of students. Next B grade will be given to top 15 percent of students, Next 45 percentage of students get C . The rest get grades $D/E/F$ based on pass mark cutoff at the end and institute regulations for online teaching. Generally, to get a grade I expect that the student gets a minimum of 30 points out of 100 points (40 points for midsem and 60 for endsem).

References

- (1) "Algebra" by Michael Artin (the second edition).
- (2) "Galois theory" by Emil Artin.

I will upload lecture notes after each lecture on my webpage. I will not strictly follow any of these books.