Algebra I

Tuesday-Thursday 2:00-3:30, AG-77

Office: School of Mathematics, A335
E-mail: swarnava@math.tifr.res.in
Office Hours: Wednesday 11:30AM and Friday 11:30AM or by appointment.
Course Website: `http://math.tifr.res.in/~swarnava/August2022.html`

Text: I will not follow a particular book to the line. I will suggest reference for various topics from particular books as the course develops. There are some common references:

- *Algebra* by Serge Lang.
- *Algebra* by Micheal Artin.
- *Abstract Algebra* by David Dummit and Richard Foote.
- *Representation Theory: A first course* by William Fulton and Joseph Harris.
- *Linear representation of finite groups* by Jean-Pierre Serre.

Course Descriptions: This is the first algebra course for all first year mathematics students entering the Ph.D or Int-Ph.D. program in TIFR. This course will be followed up by another algebra course and both of them will be part of the interview which is conducted at the end of the first year of the program. I will try to cover the following topics:

- Group actions, solvability, nilpotency, Jordan-Holder theorem, fundamental theorem for finite generated abelian groups.
- Categories and Functors, Yoneda lemma.
- Modules over a PID and applications to linear algebra.
- Multilinear algebra.
- Semisimple Rings: Artin-Wedderburn theory.
- Representation of finite groups and their characters.
- Homological algebra.

Grading Scheme: Regular problem sets will be posted on the website regularly and will be graded. It will very important that you work on those problems on a regular basis. The grading scheme for the class will be the following:

Homework	15 %
Midterm	35 %
Final Exam	50 %