PROF.KRISHNA HANUMANTHU

Department of Mathematics
Chennai Mathematical Institute

PRE-REQUISITES : A little bit of abstract group theory and a little bit of linear algebra.

INTENDED AUDIENCE : B.Sc and M.Sc students studying mathematics

COURSE OUTLINE :

This course will cover basics of abstract rings and fields, which are an important part of any abstract algebra course sequence. We will spend roughly the 4-5 weeks on rings. We will begin with definitions and important examples. We will focus cover prime, maximal ideals and important classes of rings like integral domains, UFDs and PIDs. We will also prove the Hilbert basis theorem about noetherian rings. The last 3-4 weeks will be devoted to field theory. We will give definitions, basic examples. Then we discuss extension of fields, adjoining roots, and prove the primitive element theorem. Finally we will classify finite fields.

ABOUT INSTRUCTOR :

Prof. Krishna Hanumanthu is an associate professor of mathematics at Chennai Mathematical Institute (CMI). He studied BSc and MSc in CMI during 1998-2003 and did his PhD in mathematics at University of Missouri during 2003-2008. He joined CMI as a faculty member in 2011 after working for 3 years at University of Kansas. His main areas of research are algebraic geometry and commutative algebra. He has been teaching for almost 15 years and taught introductory courses on abstract algebra (including group theory) many times.

COURSE PLAN :

Week 1: Definition of rings, examples, polynomial rings, homomorphisms.

Week 2: Ideals, prime and maximal ideals, quotient rings.

Week 3: Noetherian rings, Hilbert basis theorem.

Week 4: Integral domains, quotient fields.

Week 5: Unique factorization domains, principal ideal domains.

Week 6: Definition of fields, examples, degree of field extensions.

Week 7: Adjoining roots, primitive element theorem.

Week 8: Finite fields.