A BASIC COURSE IN NUMBER THEORY

PROF. SHRIPAD GARGE
Department of Mathematics
IIT Bombay

PRE-REQUISITES : Knowledge of basic group theory and ring theory will be useful but it is not necessary.

INTENDED AUDIENCE : Students with basic knowledge of Mathematics can take this course.

COURSE OUTLINE :
This course intends to develop the basics of number theory touching upon many essential points such as the prime number theorem, quadratic reciprocity laws, Gauss' theorem on the classification of binary quadratic forms, Brahmagupta-Pell equations, to quote a few. This course will enable a student to learn more advanced topics in number theory.

ABOUT INSTRUCTOR :
Prof. Dipendra Prasad, an Assistant Professor at the Mathematics department, IIT Bombay. His research interests are in Group Theory and Number Theory.

COURSE PLAN :

 Week 1**:** Factorization of numbers, primes

 Week 2**:** GCD, Euclid's algorithm, properties of primes

 Week 3**:** Arithmetical functions, examples,

 Week 4**:** Dirichlet product, Möbius inversion

 Week 5**:** Congruences, Chinese remainder theorem, primitive roots,

 Week 6**:** Quadratic reciprocity law, applications

 Week 7**:** Binary quadratic forms, Gauss' theory of reduced forms

 Week 8**:** Sums of two squares, sums of four squares

 Week 9**:** Diophantine approximation, theorems of Dirichlet and Liouville

 Week 10**:** Continued fractions, quadratic irrationals

 Week 11**:** Quadratic extensions of rationals, units in the rings of integers

 Week 12**:** Diophantine equations with special reference to Brahmagupta-Pell equation