

# Riemann Hypothesis and its Applications - Video course

## COURSE OUTLINE

Riemann Hypothesis is one of the most important unresolved conjectures in mathematics. It connects the distribution of prime numbers with zeroes of Zeta function, defined on the complex plane. A number of algorithms in algebra and number theory rely on the correctness of Riemann Hypothesis or its generalizations.

This course will describe the connection between prime distributions and Zeta function leading to the Riemann Hypothesis proving Prime Number Theorem along the way. It will then investigate generalizations of Riemann Hypothesis and their applications to computer science problems.

## COURSE DETAIL

Sl. No	Topic	Number of Lecture(s)
1	Prime counting and other arithmetic functions	3
2	Brief overview of complex analysis	4
3	Zeta function definition and basic properties	3
4	Riemann Hypothesis and its relationship with prime counting	8



NP-TEL

# NPTEL

<http://nptel.iitm.ac.in>

## Computer Science and Engineering

### Pre-requisites:

- Math 102 and 103 of IITK, or its equivalent

### Hyperlinks:

- <http://hh-mouvement.com/pagesperso-orange.fr/book.pdf>

### Coordinators:

**Prof. Manindra Agrawal**  
Department of Computer Science and Engineering IIT Kanpur

5	Prime Number Theorem	4
6	Dirichlet L-functions and Extended Riemann Hypothesis	6
7	Applications of Riemann and Extended Riemann Hypothesis	4
8	Generalized Riemann Hypothesis, and its proof for functions fields, finite fields, and elliptic curves	8

▪

**References:**

1. M. Ram Murty. Problems in Analytic Number Theory, Graduate Text in Mathematics 206, Springer 2001.
2. Peter Borwein, Stephen Choi, Brendan Rooney, Andera Wierathmueller. The Riemann Hypothesis, Springer 2006. (Available at <http://hh-mouvement.com/pagesperso-orange.fr/book.pdf>).
3. Research papers.