Course Type	CourseCode	Name Of the Course	L	T	P	Credits
DE	NMCD537	Analytic Number Theory	3	0	0	3

CourseObjective

- To study the different properties of prime numbers
- To introduce Riemann zeta functions, L-functions and modular forms and study their analytical properties.

LearningOutcomes

Students will be able to understand

- different properties of prime numbers
- basics of Riemann zeta functions, L-functions and modular forms and their analytical properties.

Unit No.	Topics To be Covered	Lecture Hours	Learning Outcome
1	The Wiener-Ikehara Tauberian theorem, the Prime Number Theorem. Dirichlet's theorem for primes in an Arithmetic Progression.	9	Students will learn different properties of prime numbers.
2	Zero free regions for the Riemann-zeta function and other L-functions. Euler products and the functional equations for the Riemann zeta function and Dirichlet L-functions.	9	Students will learn the basics of Riemann-zeta function and other L-functions and its properties.
3	Modular forms for the full modular group, Eisenstein series, cusp forms, structure of the ring of modular forms.	9	Students will learn the basics of modular forms.
4	Hecke operators and Euler product for modular forms.	6	Students will learn about Hecke operators and Euler product for modular forms.
5	The L-function of a modular form, functional equations. Modular forms and the sums of four squares.	9	Students will learn the L-function of a modular form and its properties.
	Total	**42**	

Text Books:

1. S. Lang, Algebraic Number Theory, 2nd Edition, Springer, 2000.

2. J.P. Serre, A Course in Arithmetic, Springer-Verlag, 1996.

Reference Books:

1. T. Apostol, Introduction to Analytic Number Theory, Springer, 2010.

2. M. Overholt, A Course in Analytic Number Theory, American Mathematical Society, 2014.