

# IIT Madras Centre for Indian Knowledge Systems

## COURSE TITLE: MATHEMATICS IN INDIA

**Focus Area/Subject Area:** History and Development of Mathematics in India

**Course Frequency:** 3 Hrs/Week (Total: 42 Hrs)

**Eligibility:** Undergraduate Degree

**Prerequisite:** High School with Maths and Basic Sanskrit

### **Details of the Instructor:**

Dr. Aditya Kolachana

### **Course Objectives:**

This course will introduce students to some of the fundamental contributions to mathematics made in India over the course of history and examine their scientific and pedagogical significance in the modern context.

### **Learning Outcome:**

The students will gain an understanding of the history and development of mathematics in India. They will learn some of the important mathematical results and techniques given by Indian mathematicians, study mathematical proofs in the Indian tradition, and appreciate the pedagogical significance of the Indian approach to mathematics.

## SYLLABUS

### **Unit 1. Origins: Vedas and Śulbasūtras**

- Place value system
- Conception of zero
- Origins of geometry

### **Unit 2. Overview of important mathematical texts and the contributions of leading Indian mathematicians**

- Āryabhaṭīya of Āryabhaṭa
- Brāhmasphuṭasiddhānta of Brahmagupta
- Līlāvātī and Bījagaṇita of Bhāskarācārya
- The Kerala school – Mādhava, Nīlakaṇṭha, Jyeṣṭhadeva, etc.

### **Unit 3. Mathematical proofs, teacher-disciple lineages, and transmission of knowledge**

- Mathematical proofs given by Bhāskara-I, Nīlakaṇṭha, Jyeṣṭhadeva, Munīśvara, etc.
- An overview of the major teacher-disciple mathematical lineages of India
- Transmission of mathematical knowledge between India and other civilizations

**References:**

1. The Science of the Śulba, B. Datta, University of Calcutta, 1932
2. History of Hindu Mathematics: A Source Book, B. Datta and A. N. Singh, Asia Publishing House, 1962
3. Āryabhaṭīya of Āryabhaṭa, K. S. Shukla and K. V. Sarma, Indian National Science Academy, 1976
4. Geometry in Ancient and Medieval India, T. A. Sarasvati Amma, Motilal Banarasidass, 2007
5. Gaṇita-yukti-bhāṣā of Jyeṣṭhadeva, K. V. Sarma et. al., Hindustan Book Agency, 2008
6. Studies in Indian Mathematics and Astronomy: Selected Articles of Kripa Shankar Shukla, Kolachana et. al. (eds.), Culture and History of Mathematics 12, HBA, 2019
7. Līlāvātī of Bhāskarācārya, H. T. Colebrooke, ed. by H. C. Banerji, Kitab Mahal, 1967
8. Mathematics in India: From Vedic Period to Modern Times, M. D. Srinivas and K. Ramasubramanian and M. S. Sriram, NPTEL course