

## Scientific Literature in Sanskrit

Programme(s) in which it is offered: MA Sanskrit

<b>Course Category:</b> Core	<b>Schedule of Offering:</b> Even
<b>Course Credit Structure:</b> 3	<b>Course Code:</b> LLXXX
<b>Total Number of Hours:</b> 3	<b>Contact Hours Per Week:</b> 3
<b>Lecture:</b> 3,3	<b>Tutorial:</b> 0,0
<b>Practical:</b> 0,0	<b>Medium of Instruction:</b> English
<b>Date of Revision:</b> 05/10/2021	<b>Skill Focus:</b> Employability/Others
<b>Short Name of the Course:</b> Scientific Literature in Sanskrit	<b>Course Stream (Only for Minor Courses):</b>
<b>Grading Method:</b> Regular	<b>Repeatable:</b> Credit
<b>Course Level:</b> Intermediate	

### Course Description

This is a core course for MA Sanskrit students. The students will be introduced to the idea of science, scientific methods and achievements as reflected in Sanskrit sources from ancient to early modern period.

### Course Introduction

The most common opinion about Science is that it is a Western phenomenon and that other civilizations lacked a scientific understanding of the world. However, the work of researchers like Joseph Needham has shown that this is inaccurate. A systematic enquiry into the empirical world was carried out by several civilizations in their own way. Further, the popular notion about the Sanskrit language is that it was a medium of offering prayers, expressing mystic thoughts or used for producing poetry.

The purpose of this course is to break both the stereotypes by understand India's contribution to Science and Technology by drawing upon literature available in Sanskrit language. Based on selections from the Veda to the Kerala School of Mathematics and Astronomy (15<sup>th</sup> - 17<sup>th</sup> century CE) the course will be an opportunity for the student to re-examine their understanding of Science and also find out how Indian scientists approached empirical problems and expressed the solution in a unique way.

### Course Objective

- To provide the student an elaborate survey of the Scientific literature in Sanskrit.
- To introduce the student to indigenous ideas and methods of empirical inquiry into the natural world as presented in Sanskrit sources.
- To familiarize the student with the general nature of scientific expression in Sanskrit sources.
- To provide the student an opportunity to re-examine the nature of Science and its history based on the study of scientific literature in Sanskrit.

### Course Outcome

At the end of the course:

- The student will have an intermediate level knowledge of the extent of Scientific literature in Sanskrit.
- The student will be familiar with some of the most significant achievements of pre-modern Indian thinkers in the area of Mathematics, Astronomy, Medicine, Physics and Alchemy (Rasaśāstra).
- The student will have an introductory understanding of the methods used by Indian thinkers in the various empirical sciences particularly Mathematics, Astronomy and Medicine.
- The students will be able to contextualize scientific ideas within the over arching intellectual framework of pre-modern India as represented in the Sanskrit language.

### PO-CO Mapping

**PO-CO Mapping Matrix**

CO/PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6
CO1						
CO2						
CO3						
CO4						
CO5						

### Prerequisites and other constraints

There are no special prerequisites for this course.

### Pedagogy

The course will use lectures, class handouts, published articles/chapters and selections from original sources (with translation) for its classes. The medium of instruction will be English while retaining the Sanskrit terminology wherever applicable. The slides used by the instructor will not be given to the students. Instead the students are expected to take notes during the lecture.

### Suggested Reading:

1. Bose, D. M., S. N. Sen, B. V. Subbarayappa. 1971. *A Concise History of Science in India*. New Delhi: Indian National Science Academy
2. Sreedharan, M. S. 2007 (reprint). *Bhāratīya Vigyan Manjusha*. New Delhi: Publications Division, Ministry of Information and Broadcasting, Government of India
3. Ray, Priyadarajan and S. N. Sen. 2018 (reprint). *The Cultural Heritage of India, Vol. VI, Science and Technology*. Kolkata: The Ramakrishna Mission Institute of Culture.
4. Gopalakrishnan, N. *Indian Scientific Heritage*, Thiruvananthapuram: Indian Institute of Scientific Heritage.

### Evaluation Pattern

**Evaluation Matrix**

	Component Type	Weightage Percentage	Total Marks	Tentative Dates	Course Outcome Mapping
Continuous Internal					

Assessment (CIA) Components*					
	CIA Marks	50%	100		
ESE	50%	100			

\* The assignments involved in CIA will be subject to plagiarism checks. A submission with unexplained similarities exceeding 30% for Undergraduate courses, 20% for Postgraduate courses and 10% for PhD courses will be reverted for resubmission. The final submission is subject to score penalization as defined by the course instructor at the start of the course, with a clear communication of the same to all the registered candidates.

## Module Sessions

### Module 1: Introduction

(No. of Hours:6)

Definition of Science – Brief history of Science in India – Overview of Scientific literature in Sanskrit - Nature of Science in pre-modern India – Scientific methodology used by pre-modern Indian thinkers

#### Reading:

1. Bose et. al. 15-37
2. Dutta, K. K. 'Scientific Literature in Sanskrit' in *The Cultural Heritage of India, Vol V, Languages and Literatures*, edited by Suniti Kumar Chatterji, 2018, Kolkata: The Ramakrishna Mission Institute of Culture
3. Class handout on Nature and Method of Science in pre-modern India

### Module 2: Medical Literature in Sanskrit

(No. of Hours:10)

History of Medicine in India – Survey of Sanskrit sources on Medicine – Key contributions

#### Reading:

1. Sreedhan, 72-123
2. Selections from Caraka Saṃhita, Śuśruta Saṃhita and Aṣṭāṅgharḍaya

### Module 3: Mathematical Literature in Sanskrit

(No. of Hours:10)

- History of Gaṇitaśāstra in India
- Survey of Sanskrit sources on Gaṇita
- Number System in India – Historical Evidence
- Salient features of the Indian Numeral System - The concept of zero and its importance, Large numbers & their representation, Place Value of Numerals, Decimal System
- Unique approaches to represent numbers - Bhūta Saṃkhya System, Kaṭapayādi System
- Measurements for time, distance and weight
- Magic Squares in India
- Nature of Mathematical proof
- Other key contributions

#### Reading:

1. Ray and Sen, Chapter 3: Vedic Mathematics and Chapter 4: Post-Vedic

Mathematics

2. Srinivas, M. D. *On the Nature of Mathematics and Scientific Knowledge in Indian Tradition.*
3. Selections from Śulbasūtra, Āryabhaṭīya, Līlāvati, Gaṇitasārasaṃgraha

**Activities:**

1. Using the geometric algorithms given in śulbasūtra
2. Representing numbers uses kaṭapayādi scheme, bhūtasamkhyā scheme and Aryabhata's method

**Module 4: Jyotiṣa Literature in Sanskrit**

**(No. of Hours:10)**

History of Jyotiṣa in India

Survey of Sanskrit sources on Jyotiṣa

Vāranirṇaya

Key contributions

**Reading:**

1. Balachandra, S. *Indian Astronomy: An Introduction*, Chapter 1, pp. 1-15 and pp. 64-70, Hyderabad: Universities Press
2. Sarma, K.V. *A History of Kerala School of Hindu Astronomy (In Perspective)*, Chapter 1, pp. 1-10
3. Selections from ṛg vedāṅgajyotiṣa, Sūrasiddhānta, Āryabhaṭīya, Brahmasphuṭasiddhānta, Bṛhatsaṃhita.

**Module 5: Other Scientific Literature in Sanskrit (No. of Hours:9)**

Introduction to Rasaśāstra – Literature of Rasaśāstra – Ideas for analysing physical phenomenon based on Vaiśeṣika darśana – Nature of Paramāṇu – Survey of literature on Agriculture

**Reading:**

1. Bose et. al. Chapter 5: Chemical Practices and Alchemy
2. Gopalakrishnan, Chapter 7: Ancient Indian Contributions in Metals and Alloys
3. Ray and Sen, Chapter 7: Physics and Mechanics in Ancient and Medieval India
4. Ray and Sen, Chapter 12: Agriculture in Ancient and Medieval India