

Course Name

History of Science and Technology in Ancient India (L-T-P: 3-0-0, CRD: 3)

- **Proposed Course Instructors**

Course Coordinators

1. Prof. V. N. Giri, HSS,
2. Dr. Anuradha Choudry, HSS
3. Dr. Jenia Mukherjee, HSS

Faculty from various departments

4. Prof. Somesh Kumar, Dean SA and Mathematics
5. Prof. Joysen, Architecture and Design
6. Prof. Partha P. Chakrabarti, Director and CSE
7. Prof. Somnath Bharadwaj, Physics
8. Prof. Pallab Dasgupta, Dean SRIC and CSE
9. Prof. Anirvan Dasgupta, Mechanical
10. Prof. V. R. Desai, Civil
11. Prof. Jyotirmoy Chatterjee, SMST
12. Prof. Pratim Chattaraj, Chemistry
13. Prof. Sudipto Ghosh, Metallurgy
14. Prof. Priyadarshi Patnaik, HSS
15. Prof. Suhita Chatterjee, HSS

External Guest Speakers

1. Prof. Amitabha Ghosh
2. Prof. Ajoy K. Roy
3. Prof. Soumitro Bhattacharya
4. Dr. Michel Danino, IIT Gandhinagar
5. Prof. K. Ramasubramanian, IIT Mumbai
6. Dr. Clemency Montelle, University of Canterbury, New Zealand

- **Semester in which Course will be offered**

Spring and Autumn Semester

- **Justification for Introducing the New Course**

Ancient Indian science and technology have contributed significantly to the foundations and growth of modern sciences. Yet there is little genuine material accessible to younger generations to help them understand and appreciate the extent of these contributions. Furthermore, History of Science and Technology acts as a natural bridge between humanities and sciences. This course will provide an overview of some of the chief landmarks in the development of science in India especially in the fields of mathematics, physics, astronomy, chemistry, medicine, etc. The modules will include not only specific advances or breakthroughs, but also discuss the epistemological and cultural contexts behind them. The course promises to be an eye-opener to students from a variety of disciplines.

- **Contents**

[Note: The course will pertain to the following basic structure. However, the themes might get different weightage based on analysis of interests and priorities of students which will be identified through constructivist method of interaction during the first two general introductory classes.]

1. Understanding 'science' from the Ancient Indian perspective (3 hours)

- 1.1. Ontology
- 1.2 Epistemology
- 1.3 Methodology

2. Overview of scientific developments (3 hours)

- 2.1. Chronological development and evolution
- 2.2. Sources and evidences

3. Astronomy (6 hours)

- 3.1. Ritual origins of classical Indian Astronomy
- 3.2. Knowledge revealed in the *Samhitas*, *Brahmanas*, and *Sutras*
- 3.3. Pre-*Siddhantic* and *Siddhantic* developments
- 3.4. Survey of Astronomical tables
- 3.5. Transmission and global influences

4. Mathematics (6 hours)

- 4.1. Knowledge revealed in Vedic and Post-Vedic texts
- 4.2. Contributions by eminent mathematicians: Aryabhata, Brahmagupta, Bhaskaracharya
- 4.3. The Kerala School of Mathematics
- 4.4. Traditions of Computational Techniques
- 4.5. Cross-cultural exchanges (with China, Arab World, Central Asia and Greece)

5. Medicine and Health Sciences and Technology (6 hours)

- 5.1. Ayurveda
- 5.2. Yoga
- 5.3. Contributions by Charaka and Sushruta
- 5.4 Surgery and surgical instruments

6. Allied Sciences and Technology (12 hours)

- 6.1. Contributions in the field of Architecture
- 6.2. Developments and practices in Civil Engineering
- 6.3. Advances in Metallurgy
- 6.4. Findings and applications of Chemistry
- 6.5. Measurements, Tools, Instruments and their Evolution

7. Concluding Session: (2 hours)

- 7.1. Ongoing research in this area
- 7.2. Future explorations

- **Evaluation Process**

Mid-sem – 20 marks

End-sem – 30 marks

4 Term papers – 40 marks

TA – 10 marks

- **References**

Ancient Indian Leaps into Mathematics, Yadav, B.S., Mohan & Man (eds.), 2011

Astronomy in India: A Historical Perspective, Thanu Padmanabhan (ed), 2010

Ancient Indian Medicine, P. Kutumbiah, 1962

Asceticism and Healing in Ancient India: Medicine in the Buddhist Monastery, Kenneth G. Zysk, 1991

Chemistry and Chemical Techniques in India, B. V. Subbarayappa (ed), 1999

Computing Science in Ancient India, T. R. N. Rao & Subhash Kak (eds), 2000

Geometry in Ancient and Medieval India, T. A. Sarasvati Amma, 1999

History of Astronomy in India, S. N. Sen & S. K. Shukla (eds), 2000

History of Iron Technology in India: From Beginning to Pre-Modern Times, Vibha Tripathi, 2008

History of Technology in India, A. K. Bag (ed), 1997

Indian Mathematics and Astronomy – Some Landmarks, S. Balachandra Rao, 2004

Lilavati of Bhaskaracharya, translators: K. S. Patwardhan, S. A. Naimpally & S. L. Singh, 2001

Parashara Tantra, R. N. Iyengar, 2014

The Universal History of Numbers: From Prehistory to the Invention of the Computer, George Ifrah, 2005

- **Internet Resources**

www.history.mcs.st-andrews.ac.uk/history/indexes/Indians.html

www.insa.ac.in/html/home.asp

www.infinityfoundation.com/mandal/tks_essays/essays.shtml

<http://nptel.ac.in/courses/111101080>

<http://www.youtube.com/playlist?list=PLbMVogVi5nJthf31TNSQzuN7zqxe7HdRN>

- **Text Books**

A Concise History of Science in India, Editors: D.M. Bose, S. N. Sen & B. V. Subbarayappa, 1989

Encyclopaedia of Classical Indian Sciences, Editors: Helaine Selin & Roddam Narasimha, 2007

History of Science in India – Astronomy, Amitabha Ghosh, 2014

History of Science and Technology in Ancient India, D. P. Chattopadhyaya, 1986

Indian Astronomy – A Primer, S. Balachandra Rao, 2008

Science in India: A Historical Perspective, B. V. Subbarayya, 2013