

# SYLLABUS

of the

**Value-added Course**

## **Astronomy for Everyone (MATHVAC 003)**

(w.e.f. 2022-2023)



**Offered by:**

**THE DEPARTMENT OF MATHEMATICS**

**Panskura Banamali College**

**(AUTONOMOUS)**

**Panskura R.S., Purba Medinipur**

**West Bengal – 721152**

## COURSE INFORMATION IN BRIEF

<b>Course Name:</b>	<i>Astronomy for Everyone</i>
<b>Course Contents:</b>	Learn about the origins of earth
<b>Course Type:</b>	Value-added Course (Optional, additional, and not a part of the CBCS curriculum)
<b>Medium:</b>	English
<b>Mode:</b>	Offline
<b>Intake:</b>	Minimum 20; Maximum 40
<b>Eligibility:</b>	+X, Any interested candidate in Astronomy
<b>Duration:</b>	30 hours (to complete within a time span of 2 months)
<b>Course Fees:</b>	Rs. 300
<b>Coordinator:</b>	<b>Sanjib Kumar Kuila, Assistant Professor,</b>
<b>Contact:</b>	Department of Mathematics, Panskura Banamali College (Autonomous) <a href="mailto:kuila_sanjib@yahoo.in">kuila_sanjib@yahoo.in</a> 9153376561(WhatsApp only)

## Structure & Contents

### *What is Astronomy?*

Astronomy is one of the oldest sciences and one of the most fascinating fields in human history. It is a science that allows us to peer into the past and future, and through this, we can see how life on Earth has changed over millions of years. Whether you want to find your way around the sky or learn about the origins of Earth, **astronomy courses** are perfect for beginners and experts alike.

### *The nature and scope of the course:*

This course is designed for motivating people to be aware of his own location in the universe. Location comes in respect of both the parameters; the space as well as the time. Going through this course, any person will be able to identify the limitations of his earlier views. He will better understand the nature around us. He will be able to co-ordinate his existing knowledge, which is gathered from various branches of natural sciences and social sciences.

### *Who is eligible for this course?*

Any interested student after the completion of his secondary level examination can participate in this course. For student coming from humanities or bio-sciences background, this course will be equivalent to a knowledge based co-curricular activity. For student, coming from pure sciences background, the course will prepare them for the next course, Positional Astronomy or Astrophysics.

# Program details

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**Lesson 1:** Intensive interaction with the learners to assess their previous concepts. Enquire about their expectations from curriculum.

**Lesson 2:** Describe a roadmap of the course. Discuss on objectives of the course. Describe the scope after the completion of this course.

**Lesson 3:** Ancient people felt the need to develop an annual calendar for Agriculture. The annual motion of the Earth. History of the development of Astronomy.

**Lesson 4:** Laws of Refraction and scattering of light in the atmosphere. Preliminary questions on the colour of the Sky, Ocean, rising Sun etc. large size of rising Sun or Moon. The size and the shape of the tomb over our head. Twilight, duration of twilight.

**Lesson 5:** Air pollution and pollution due to intense light. Adverse effect of intense light at night on animal and plant kingdom. Hurdles for sky watching, including weather. Location for sky watching. Magnitude of stars. What is meant by a sixth magnitude star? List of bright stars and nearby stars.

**Lesson 6:** Concept of angular distance. Approximate measurement of distance for heavenly bodies by the use of fingers of own hand ( $1^\circ$ ,  $2^\circ$ ,  $5^\circ$ ,  $10^\circ$ ,  $15^\circ$ ,  $20^\circ$ ). Applications of trigonometry; how the distance of moon, the radius of Earth etc. can be calculated!

**Lesson 7: Practical class** through sky watching. Preliminary step to revise earlier knowledge. Identification of Polestar and the constellations near to Pole (Ursa Major, Cassiopeia, Cepheus etc.). Orion, Canis Major, Canis Minor, Sirius.

**Lesson 8:** Latitude and Longitude of a place. Globe Vs Celestial sphere. Star charts. Local mean time (LMT) Vs sidereal time. Equator of earth and celestial sphere.

**Lesson 9:** Why the total circumference of a circle is  $360^\circ$ ? Daily  $1^\circ$  excess movement of stars relative to sun. Astronomical clock Vs ordinary clock.  $1^\circ$  move in every 4 minutes for every celestial object. Right ascension (R.A.) and Declination of any star and R. A. of the Sun. Clock wise and anti clockwise motion in north and south poles.

**Lesson 10:** Transportation through the ocean. Role of stars to guide sailors of a ship. Determination of the latitude and longitude of a ship?

**Lesson 11:** 88 Constellations for the demarcation of the regions of sky. The equatorial zone and polar zones of the sky. Vernal equinox, first point of Aries, first point Libra, Autumnal equinox, summer solstice and winter solstice.

**Lesson 12:** Ecliptic, Prime vertical, Zodiacal Light and Zodiac Belt. Signs of Zodiac Belt. Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricorn, Aquarius, Pisces.

**Lesson 13:** Planets, how they are distinguished from stars. Direct and retrograde motion. Moons of other planets.

**Lesson 14: Practical class** to observe planets. Jupiter along with its moons (Non visible in naked eye), Saturn, Mars etc.

**Lesson 15:** Optical Instruments, Role of Galileo Galilee to improve Telescope. Inverted image. Binoculars. Refractive and Reflexive telescopes. Types of lens and mirrors used in

objective and eyepiece. Magnification power of a telescope. Terrestrial telescope Vs Astronomical telescope. Radio telescope. space telescopes.

**Lesson 16:** Moon, the nearest celestial body. Lunar motion, phases of moon. The observation of low tide and high tide and its effects near to costal region. Weather, and its relation with lunar motion. Solar and Lunar eclipse, what are Rahu and Ketu.

**Lesson 17: Practical class** to watch Moon with the help of telescope.

**Lesson 18:** Concept of Galaxy. The Milky way galaxy. Its diameter (1 lakh light year). Position of solar system in this galaxy. Elliptical galaxy, spiral galaxy, irregular galaxy etc.

**Lesson 19:** Nebula. Crab nebula and supernova of 1054 ad., open cluster, globular cluster. Messier catalogue. New general catalogue.

**Lesson 20:** Colour of star, its significance. Blue, yellow, red stars of temperature 20,000K, 6000K, 3000K. The birth and death of stars.

**Lesson 21: Practical class** to watch Nebula and clusters (Non visible in naked eye).

**Lesson 22:** The events linked with sun. Special precautions to visualize sun through telescope. Limb darkening, Sun spot, solar flairs, solar storm and its effects on satellite communication.

**Lesson 23:** Double stars. Their significance in astronomical research. Pulsars, the way to detect black holes.

**Lesson 24: Practical class** to watch Double stars.

**Lesson 25 and 26: Practical class** to handle telescope. Through this practical class each learner will be able to set a telescope for visualizing any celestial object.

**Lesson 27:** Comets, their origin, the change of shape as it comes near the sun, the ion tail and dust tail. Bending in dust tail.

**Lesson 28:** Meteor, meteor shower, how such showers appear in particular time of a year. Annual chart of meteor shower.

**Lesson 29 & 30:** Remedial class.