CALICUT UNIVERSITY – FOUR-YEAR UNDER GRADUATE PROGRAMME (CU-FYUGP)

BSc PHYSICS HONOURS

Programme	**B.Sc. Physics Honours**				
Course Title	**ASTRONOMY AND STARGAZING**				
Type of Course	**Multi-Disciplinary Course 2**				
Semester	**II**				
Academic Level	**100 - 199**				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	3	3	-	-	45
Pre-requisites	High school level science				
Course Summary	This introductory course in amateur astronomy provides students with a foundational understanding of observational astronomy, celestial objects and basic techniques for amateur stargazing. Through a combination of lectures, classroom demonstrations and field observations, students will gain practical skills and theoretical knowledge to explore the wonders of the night sky.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Understand the development of astronomical knowledge from the ancient	U	C	Instructor-created

	models to the modern astronomical theories.			exams / Quiz
CO2	Understand the scientific principles underlying astronomical observations and the characteristics and properties of celestial objects	U	C	Instructor-created exams / Quiz
CO3	Apply observational techniques and methods to effectively navigate the night sky.	Ap	P	Observational Home Assignment / Viva Voce
CO4	Analyze astronomical phenomena such as phases of the moon, alignments of constellations and planets.	An	P	Demonstration Skills / Viva Voce
CO5	Foster an interest in citizen science and amateur contributions to astronomy.	An	P	Instructor-created Home Assignments
CO6	Develop a scientific temper, curiosity and a sense of wonder about the universe	Ap	P	Instructor-created Home Assignments
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus:

Module	Unit	Content	Hrs (36+9)	Marks (50)
I	**Astronomy- an overview**		**10**	**15**
	1	Ancient Astronomy- Astronomy around the World, Early Greek and Roman Cosmology, Ptolemy's Model of the Solar System, Astrology and	2	

		Astronomy- The Beginnings of Astrology, The Horoscope, Astrology Today		
	2	The Celestial Sphere, Celestial Poles and Celestial Equator, Rising and Setting of the Sun, Fixed and Wandering Stars, Constellations	2	
	3	The Birth of Modern Astronomy-Copernicus, The Heliocentric Model, Galileo and the Beginning of Modern Science, Galileo's Astronomical Observations, Kepler's Laws of Planetary Motion, Orbits in the Solar System	3	
	4	Telescopes, How Telescopes Work, Formation of an Image by a Lens or a Mirror	1	
	5	The Nature of Astronomy, The Nature of Science, The Laws of Nature, Numbers in Astronomy, A Tour of the Universe, The Universe on the Large Scale, The Universe of the Very Small, A Conclusion and a Beginning	2	
	Sections 1.1-1.4, 1.6-1.9, 2.1-2.4, 3.1,3.4, 6.1 of Book 1			
II	**Step into the Sky**		**6**	**10**
	6	Darkness and Light, Finding Your Way around the Sky, Cosmic Protractor, Special Effects, Night Vision, The Milky Way	2	
	7	Moon: Phases of Moon, Characteristics, Moonrise, Moonset, Moon Illusion	1	
	8	Sightseeing on the moon, Lunar topography, Formation	2	
	9	Lunar Eclipse	1	
	Chapter 1 & 2 of Book 2			
III	**Sun and Planets**		**10**	**12**
	10	Sun, How seasons happen, Sun paths, Telling time by the Sun	1	
	11	A visit to the sun, Power house, Storms on Sun, How the Sun formed, Our sun is born	2	

	12	Solar Eclipse, How Are Eclipse of the Sun and Moon the Same-and Different? Why Can't We Look at the Sun? What to take eclipse-watching?	1	
	13	Planets: Earth's siblings in the sky, Star or Planet? Sky Wanderer, Roaming around Solar system	2	
	14	Terrestrial & Jovian Planets, Small solar system Bodies, Meet the eight planets	2	
	15	How the Solar System Formed, Comets, Other suns and their Solar Systems	2	
	Chapter 3 & 4 of Book 2			
IV	**Stars, constellations & stellar evolution**		**10**	**13**
	16	Stars and Constellations: How stars move during the night, North star	2	
	17	North & South Using the Stars, The Zodiac and the Ecliptic, Rasis & Nakshatras	2	
	18	Seasonal Sky gazing Northern Hemisphere - November, December & January Stars. (Constellations Orion, Canis Major, Lepus, Taurus, Gemini, Auriga)	3	
	19	How Stars Are Born, Live, and Die, Meteor Shower. Deep Sky Objects.	3	
	Chapter 5 of Book 2 and Chapter 3 & 10 of Book 3			
V	**Open Ended Module: Hands-on Astronomy**		**9**	
	1	• Demonstrations using Stellarium or any other sky guide apps – constellations, eclipses, planetary alignment etc. https://va-iitk.vlabs.ac.in/?page=exp1 • Citizen science projects like Galaxy-zoo • Smartphone Astrophotography		
	References 4-7			

Books and References:

1. Astronomy 2e by Andrew Fraknoi, David Morrison, and Sidney C. Wolff, OpenStax CNX (Book 1) https://open.umn.edu/opentextbooks/textbooks/390
2. Sky Gazing- A Guide to the Moon, Sun, Planets, Stars, Eclipses, and Constellations by Meg Thacher, Storey Publishing. (Book 2)
3. The Joy of Skywatching by Biman Bose, National Book Trust , India. (Book 3)
4. https://stellarium.org/
5. https://va-iitk.vlabs.ac.in/?page=exp1
6. https://www.zooniverse.org/projects/zookeeper/galaxy-zoo/
7. A Guide to Smartphone Astrophotography by Dr. Sten Odenwald, a free e-book from NASA https://spacemath.gsfc.nasa.gov/SMBooks/AstrophotographyV1.pdf

Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO3	PSO 4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7
CO 1	1	2	2	2	0	0	0	0	0	0	0	0	0
CO 2	2	2	2	2	0	0	0	0	0	0	0	0	0
CO 3	2	1	1	1	1	0	0	0	0	0	0	0	0
CO 4	1	1	1	2	1	0	0	0	0	0	0	0	0
CO 5	1	2	1	1	0	0	0	0	0	0	0	0	0
CO 6	1	2	1	1	0	0	0	0	0	0	0	0	0

Correlation Levels:

Level	Correlation
0	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Discussion / Seminar
- InternalTheory/Practical Exam
- Assignments /Viva
- End Semester Exam (70%)

Mapping of COs to Assessment Rubrics

	Internal Theory /Practical Exam	Assignment /Viva	Practical Skill Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3	✓	✓		✓
CO 4	✓	✓		✓
CO 5	✓	✓		✓
CO 6		✓	✓	