

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI**  
**COURSE PLAN June - November 2024**

**Department** : Physics  
**Name/s of the Faculty** : Ms. Panimaya Peshija. A  
**Course Title** : Astrophysics  
**Course Code** : 23PH/PE/AP15  
**Shift** : II

**COURSE OUTCOMES (COs)**

<b>COs</b>	<b>Description</b>	<b>CL</b>
<b>CO1</b>	Recall and relate the violent Universe (white dwarfs,neutron stars, black holes etc.) beyond our planet and to describe the measurements of space and time.	<b>K1</b>
<b>CO2</b>	Explain the origin of our universe and apply basic physical principles from the wide range of topics in physics to astronomical situations.	<b>K2</b>
<b>CO3</b>	Demonstrate the relation between the temperature of a stellar core to its strength, colour and chemical composition and to manipulate them algebraically	<b>K3</b>
<b>CO4</b>	Categorize the importance of stellar magnetic fields, stellar populations, their classification and also to visualize the position of solar system, galactic objects in scale models.	<b>K4</b>
<b>CO5</b>	Critically analyse the astronomical/physical concepts which enable them to interpret quantitative observations of celestial objects.	<b>K5</b>

<b>Week</b>	<b>Unit No.</b>	<b>Content</b>	<b>Cognitive Level</b>	<b>Teaching Hours</b>	<b>COs</b>	<b>Teaching Learning Methodology</b>	<b>Assessment Methods</b>
Jun 24 – 26, 2024 (Day Order 4 - 6)	I	General Astronomy System of Coordinates - Altazimuth, Equatorial (local and Universal), Ecliptic and Galactic systems	K1-K5	3	CO1-CO5	Lecture, blackboard, Charts	Discussion and questioning
Jun 27 – July 4, 2024 (Day Order 1 - 6)	I	Conversion of co-ordinates. Time scale - Magnitude scale and magnitude systems - correction for observed magnitudes. The proper motion - stellar parallax - Trigonometric, cluster and secular parallaxes.	K1-K5	5	CO1-CO5	Lecture, PPT	Discussion and questioning
July 5 – 12, 2024 (Day Order 1 - 6)	I,II	Method of Luminosity distance Stellar temperatures and sizes Colour and effective temperatures - defining stellar temperatures by matter laws - HR diagram	K1-K5	1 4	CO1-CO5	Lecture, PPT	Discussion and questioning

July 15 – 23, 2024 (Day Order 1 - 6)	II	Spectral and luminosity classification of stars Measurement of stellar radii - Relation of luminosity with mass, radii and surface temperature	K1-K5	5	CO1-CO5	Lecture, Blackboard	Discussion and questioning
July 24 – 31, 2024 (Day Order 1 - 6)	II	Binary stars – visual, spectroscopic and eclipsing binaries.	K1-K5	3	CO1-CO5	Lecture, PPT	Test-K2
Aug 1 – 5, 2024 (Day Order 1 - 3)	III	Stellar structure Equations of stellar structure - Russel - Vogt theorem	K1-K5	3	CO1-CO5	Lecture, Blackboard	Discussion and questioning
Aug 6 – 10, 2024	<b>C.A. Test - I</b>						
Aug 12 – 14, 2024 (Day Order 4-6)	III	Ideas of polytropic model - stellar opacity - Free - Free transitions, Bound - Free transitions and electron scattering	K1-K5	2	CO1-CO5	Lecture, Blackboard	Discussion and questioning
Aug 16 – 23, 2024 (Day Order 1-6)	III	Eddington's standard model - Homologous model for main sequence stars	K1-K5	5	CO1-CO5	Lecture, Blackboard	Discussion and questioning
Aug 27 – Sep 3, 2024 (Day Order 1-6)	III	Schwarzschild's model for real stars	K1-K5	5	CO1-CO5	Lecture, Blackboard	Discussion and questioning

Sep 4 – 11, 2024 (Day Order 1-6)	IV	Stellar evolution The virial theorem - application to an isothermal gas sphere evolution of stars near the main sequence	K1-K5	5	CO1- CO5	Lecture, Blackboard	Problem test- K5
Sep 12 - 20, 2024 (Day Order 1-6)	IV	effect of hydrogen depletion - Schoenberg - Chandrasekhar limit of an isothermal core - nuclear time scale -	K1-K5	5	CO1- CO5	Lecture, Blackboard	Quiz-K4
Sep 23 - 26, 2024 (Day Order 1-4)	IV	ages of clusters- Star formation - Jean's criterion.	K1-K5	1	CO1- CO5	Lecture, PPT	Discussion and questioning
Sep 27 – Oct 3, 2024	<b>C.A. Test - II</b>						
Oct 4 – 5, 2024 (Day 5 & 6)	V	Stellar energy sources Thermonuclear fusion -	K1-K5	2	CO1- CO5	Lecture, Demonstration video	Discussion and questioning
Oct 7 - 15, 2024 (Day Order 1 to 6)	V	CN cycle - pp chain - simple formulae for the energy generation rates	K1-K5	5	CO1- CO5	Lecture, Blackboard, PPT	Seminar-K5
Oct 16 - 22, 2024 (Day Order 1 to 6)	V	abundances for the elements in the stars structure of the sun from helioseismology - problems of nucleosynthesis.	K1-K5	5	CO1- CO5	Lecture, Blackboard	Discussion and questioning

Oct 23 - 24, 2024  
(Day Order 1 to 2)

**REVISION**