STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN (November 2024 – April 2025)

Department : **Mathematics**

Name of the Faculty : **Dr. Teresa Arockiamary S**

Course Title : **ELEMENTS OF SPACE SCIENCE**

Course Code : **23MT/ME/ES45**

Shift : **1**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	explain fundamental ideas in the field of astronomy	K1
CO2	acquire the knowledge of the concepts governed by mathematics to the universe	K2
CO3	showcase the principles governing the movement of celestial objects	K3
CO4	analyze and spot the celestial bodies in the sky by naked eye / binoculars / telescopes	K4
CO5	visualize the real time application of mathematics in space science	K5

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods

Nov 18 – 25, 2024 (Day Order 1-6)	1	**Spherical Trigonometry** 1.1 Spherical Trigonometry 1.2 Spherical Triangle- Polar Triangle - Definition 1.3 Some Properties of Spherical Triangles	K1-K5	5	CO1-5	Lecture Group discussions	Questioning and Interaction
Nov 26- Dec 3, 2024 (Day Order 1 to 6)	1	1.4 Relations Between the Sides and Angles of a Spherical Triangle- Cosine, Sine, Cotangent Formula, Supplemental Cosine Formula, Five Parts Formula, Napier's Formula (Statements Only) 1.5 Napier's Analogies and Napier's Rules 1.6 Simple Problems Based on the Concepts Only	K1-K5	5	CO1-5	Lecture Problem solving	Questioning and Interaction Slip test
Dec 4-11, 2024 (Day Order 1 to 6)	2	**Celestial Sphere, Diurnal Motion** 2.1 Celestial Sphere, Diurnal Motion- Celestial Axis, Celestial Equator – Celestial Horizon, Celestial Meridian 2.2 Cardinal Points - Declination Circles – Verticals – Parallactic Angle	K1-K5	5	CO1-5	Lecture Group discussions	Questioning and Interaction Component 1: Quiz (20 marks) Unit 1

		2.3 Annual Motion of the Sun – First Point of Aries and First Point of Libra – Equinoxes and Solstices – Colures 2.4 Celestial Co-ordinates					
Dec 12-19, 2024 (Day Order 1 to 6)	2	2.5 To Represent the Different System of Coordinates in the Same Figure 2.6 To Find the Relation between Right Ascension and Longitude of the Sun 2.7 To Find the Longitude of Sun on Any Day 2.8 Latitude of a Place 2.9 To Find the Right Ascension and Declination of a Body	K1-K5	5	CO1-5	Lecture Presentations	Questioning and Interaction Slip test
Dec 20, 2024 (Day Order 1)	2	2.10 To Find the Hour Angle of a Body at Rising Or Setting – Duration of Day Time	K1-K5	1	CO1-5	Group discussion	Interactions
Jan 3 – 7, 2025 (Day Order 3 to 6)	2 3	2.11 Morning and Evening Stars – Circumpolar Stars- Condition for Circumpolar Star **The Earth** 3.1 Zones of Earth	K1-K5	4	CO1-5	Lecture Presentations	Questioning and Interaction Component 2: Group presentations (15 marks) Sections 2.11,

							3.1, 3.9,3.10,4.1,4.6
Jan 8 – 17, 2025 (Day Order 1 to 6)	3 5	3.2 Variations in Duration of Day and Night Setting of Telescope: Stars, star clusters and Constellations	K1-K5	1 4	CO1-5	Lecture **Hands on experience: Telescope Setting** **Sky Observation**	Questioning and Interaction Component 3: Report submission on night sky observation and identifying stars, planets, constellations (15 marks) Unit 5
Jan 18 - 23, 2025	**C.A. Test – I Units 1 & 2**						
Jan 24 -31, 2025 (Day Order 1 to 6)	3	3.3 Duration and Condition for Perpetual Day and Perpetual Night 3.4 Simple Problems Based on Above Concepts Only 3.5 Terrestrial Latitudes and Longitudes 3.6 Phenomena on Change of Latitudes and Longitudes 3.7 Date Line – Shape of Earth	K1-K5	5	CO1-5	Presentations Field trip to Periyar science and technology- Birla Planetarium Problem solving	Slip test Report submission

Feb 3-8, 2025 (Day Order 1 to 6)	3	3.8 Reduction of Latitude 3.9 Dip of Horizon – Expression and Effects of Dip 3.10 Twilight - Duration of Twilight – Civil, Nautical and Astronomical Twilights **Planetary Phenomena** 3.11 Elongation of a Planet	K1-K5	5	CO1-5	Lecture Group discussion	Questioning and Interaction
Feb 10– 18, 2025 (Day Order 1 to 6)	3 4	3.12 Direct and Retrograde Motions of Planets 3.13 To Find Positions of two Planets when they are Stationary as Seen from each other **Kepler's Laws** 4.1 Kepler's Laws of Planetary Motion 4.2 To calculate the eccentricity of the Earth's orbit around the Sun 4.3 Newton's Deduction from Kepler's Laws - Kepler's Third Law from Newtons Law of Gravitation	K1-K5	4 1	CO1-5	Lecture Presentations	Questioning and Interaction
Feb 19- 26, 2025 (Day Order 1-6)	4	4.4 To Find the Mass of a Planet **The Moon** 4.5 Relation Between Sidereal and Synodic Months 4.6 Phases of Moon 4.7 Position of Moon at Rising and Setting	K1-K5	5	CO1-5	Lecture	Questioning and Interaction Slip test

Feb 27- Mar 6, 2025 (Day Order 1 to 6)	4	4.8 Lunar Day, Lunar Time and Surface Structure of Moon 4.9 Earth Shine - Tides **Eclipse** 4.10 Lunar Eclipse – Solar Eclipse 4.11 Condition for the Occurrence of Lunar and Solar Eclipse 4.12 Maximum and Minimum Number of Eclipses Near the Node of Lunar Orbit, Maximum Number of Eclipses in a Year	K1-K5	5	CO1-5	Lecture Presentations	Questioning and Interaction Slip test
Mar 7 – 11, 2025 (Day Order 1 to 3)	4	4.13 Eclipse Seasons - Effect of Refraction on a Lunar Eclipse – Importance of Total Solar Eclipse 4.14 Occultations	K1-K5	2	CO1-5	Lecture	Questioning and Interaction
Mar 12 –17, 2025	**C.A. Test – II Units 3 & 4**						
Mar 18 – 20, 2025 (Day 4 to 6)	5	**Time** 5.1 Seasons and its causes 5.2 Calendar	K1-K5	3	CO1-5	Lecture Problem solving	Questioning and Interaction
Mar 21 - 28, 2025 (Day Order 1 to 6)	5	5.3 Conversion of time 5.4 Simple Problems Based on the Concepts Only	K1-K5	5	CO1-5	Lecture Group discussions	Questioning and Interaction

Mar 29- April 2, 2025 (Day Order 1 to 3)	**REVISION**

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