

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI**COURSE PLAN (June - November 2026)**

Department : Physics
Name/s of the Faculty : Dr. M. Asisi Janifer and Dr. Rachel Darathy
Course Title : STATISTICAL MECHANICS
Course Code : 23PH/PC/SM14
Shift : II

COURSE OUTCOMES (COs)

COs	Description						CL
CO1	recall and relate statistical methods to ideal gas, actual gas and harmonic oscillator in the field of thermodynamics.						K1
CO2	provide a description of the relevant parameters, thermodynamic ensembles, and potentials that are employed to describe macroscopic systems.						K2
CO3	compute thermodynamic probability and apply probability theory to the distribution of particles in multiple systems.						K3
CO4	distinguish the characteristics of quantum systems including phonon gas, photon gas and electron gas using statistical methods.						K4
CO5	develop analytical skills for problem solving in statistical mechanics.						K5
Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods

Jun 22, 2026 (Day Order 6)	5	Ideal Fermi gas	K1-K5	1	1-5	Lecture and discussion	One-minute summary by students
Jun 23 – July 1, 2026 (Day Order 1- 6)	1 5	Foundation of statistical Mechanics - connection between statistical mechanics and thermodynamics Fermi Dirac distribution – thermodynamic properties of Fermi gas	K1-K5	5	1-5	Lecture with PPT	Formative assessment
July 2 – July 8, 2026 (Day Order 1- 6)	1 5	classical ideal gas – Gibb’s paradox – phase space electrons in metals – electronic heat capacity – paramagnetic susceptibility-	K1-K5	5	1-5	Lecture through real life examples	Group Discussion One page assignment
July 9 – 16, 2026 (Day Order 1- 6)	1 5	Liouville’s theorem, microcanonical ensemble white dwarf – Chandrasekhar limit – nuclear matter.	K1-K5	4	1-5	Lecture and discussion	Group Discussion
July 17 – 24, 2026 (Day Order 1- 6)	1	classical gas in microcanonical ensemble- linear harmonic oscillator	K1-K5	4	1-5	ICT enabled teaching	Third component 1 Theory Test –

	2	Classical Canonical ensembles –partition function – connection with thermodynamics – energy fluctuation					15 Marks Units 1,5 and 2.1.1 (K1 – K3)
July 25 – 28, 2026 (Day Order 1- 3)	1 2	coarse graining of phase space classical ideal gas in canonical ensembles - calculation of statistical quantities – equipartition theorem – classical harmonic oscillator	K1-K5	5	1-5	Blackboard Lecture	Mock test using old question paper
July 29 – Aug 3, 2026	C.A. Test – I						
Aug 4 - 6, 2026 (Day Order 4 - 6)	4 2	Ideal Bose gas two level system – concept of negative temperature – particle in a box	K1-K5	3	1-5	Lecture with PPT	Group Discussion
Aug 7 – 14, 2026 (Day Order 1- 6)	4 2	thermal properties linear harmonic	K1-K5	5	1-5	Lecture through real life example	Third component 2 – Seminar : 15 marks –k5

