भारतीय प्रौद्योगिकी संस्थान तिरुपति
TIRUPATI

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
भारतीय प्रौद्योगिकी संस्थान तिरुपति
Yerpedu-Venkatagiri Road, Yerpedu Post, Tirupati District, Andhra Pradesh - 517 619

1.	Title of the course	Advanced Statistical Physics
2.	Course number	PH615L
3.	Structure of credits (L-T-P-C)	3-0-0-3
4.	New course/modification to	New
5.	To be offered by	Physics
6.	Proposed by	Murari Singh
7.	Prerequisite	CoT
8.	**Course Objective(s):** To derive the advanced concepts in phase transition and nonequilibrium statistical mechanics and to explore the applications in real and applied scenarios.	
9.	**Course Content:** Phase transitions and critical phenomena: thermodynamics, metastable states, van der Waals' equation of state, symmetry breaking, Landau theory, scaling hypothesis, critical exponents, universality classes, mean field theory, Ising model, renormalization; Nonequilibrium statistical mechanics: systems out of equilibrium, H-theorem, ergodic theorem, Brownian motion, Langevin equation, fluctuation-dissipation theorem, Einstein relation, Fokker-Planck equation; Correlation functions: time correlation functions, linear response theory, Kubo formula, Onsager relations.	
10.	**Textbook(s):** 1. Goldenfeld N, Lectures on Phase Transitions and the Renormalization Group, CRC Press (2018). 2. Balakrishnan V, Elements of Nonequilibrium Statistical Mechanics, Ane Books Pvt. Ltd (2009).	
11.	**Reference(s):** 1. Kardar M, Statistical Theory of Fields, Cambridge University Press (2007). 2. Chaikin P M and Lubensky T C, Principles of Condensed Matter Physics, Cambridge University Press (1995). 3. Kadanoff L P, Statistical Physics: Statics, Dynamics and Renormalization, World Scientific (2000). 4. Stanley H E, Introduction to Phase Transitions and Critical Phenomena, Oxford University Press, New York (1987).	