Course Code	PHYS8550 (RPG)
Title	Graduate statistical mechanics
Offering Department	Physics
Course Co-ordinator	Dr K M Lee Physics
Course Co-ordinator Email	kmlee1@hku.hk

Teachers Involved	Name	Department	Percentage
	Dr K M Lee	Physics	100

Course Objectives	This course covers advanced topics in equilibrium statistical physics.
Course Contents & Topics	Topics include: Ensemble theory; theory of simple gases, ideal Bose systems, ideal Fermi systems; statistical mechanics of interacting systems; statistical field theory; some topics in the theory of phase transition may be selected.
Course Learning Outcomes (CLO)	On successful completion of this course, students should be able to: CLO 1 discuss the various classical ensembles and quantum ensembles CLO 2 solve the statistical mechanics problems using ensemble theory CLO 3 explain the connection between classical statistical mechanics and quantum statistical mechanics CLO 4 understand the phase transition, criticality, symmetry breaking, renormalization
Pre-requisites (and Co-requisites and Impermissible combinations)	Nil

Offer in 2024 - 2025	Y 2nd sem	Examination	May

Course Grade	A+ to F
Grade Descriptors	A: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. B: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. C: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. D: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills. Fail: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to

	solve problems. Organization and presentational skills are minimally effective or ineffective.
Course Type	Lecture-based elective course

Course Teaching & Learning Activities	Activities	Details	No. of Hours
	Lectures		36
	Tutorials		12
	Reading/Self study		80

Assessment Methods and Weighting	Methods	Details	Weighting in final course grade (%)
	Assignments		50
	Examination	3-hour written exam	50

Quota	9999 (9999 if no quota)
Required/recommended reading and online materials	Lecture notes provided by Course Coordinator Kerson Huang: Statistical Mechanics (2nd Edition, Wiley) R.K. Pathria: Statistical Mechanics M. Plischke and B. Bergersen: Equilibrium Statistical Physics Kardar: Statistical Physics of fields Parisi: Statistical field theory