Statistical Physics 2 schedule, Fall 2024-25

Week	Dates	Topics	Dates2	Topics2
	Tue 16:00-17:30	**Tuesday 16:00-17:30**	**Fri 08:30-10:00**	**Friday 08:30-10:00**
1	September 3, 2024	**Part I: Phase transitions** L1: Ferromagnetic transition (revision); conditional free energy, Ginzburg-Landau theory	September 6, 2024	T1: Mean field (from free energy): ferro Ising, antiferro Ising, Heisenberg
2	September 10, 2024	L2: Scaling functions, exponents and connection between critical exponents. Correlations, linear response	September 13, 2024	T2: 2-spin cluster, crit. exponents in Landau theory, scaling functions in mean field theory, tricritical point
3	September 17, 2024	SPORTS DAY	September 20, 2024	L3: Scaling and renormalization group
4	September 24, 2024	**Part II: Superfluidity** L4: Superfluidity I: basic phenomena, Tisza theory, Gross-Pitaevskii theory	September 27, 2024	L4.5: Superfluidity II: basic phenomena, Tisza theory, Gross-Pitaevskii theory, healing length, vortices
5	October 1, 2024	**Test 1** (theory + excercises): Part I: Phase transitions	October 4, 2024	L5: Superfluidity III: rotons, explanation of superfluidity, time dependent Gross-Pitaevskii equation
6	October 8, 2024	**Part III: Quantum Stat. Phys.: Density operator** L6: Density operator coupled spins, density operators, mixed and pure states	October 11, 2024	T3: Density operator
7	October 15, 2024	L7: General structure of density matrix Neumann equation (spin in external field) Time averages and equilibrium structure of DM	October 18, 2024	T4: Neumann equation, Lindblad equation(?), Principle of maximal entropy
8	October 22, 2024	L8: Dissipative spin dynamics, spin relaxation, Neumann entropy, (principle of maximal entropy)	October 25, 2024	**Test 2** (theory + exercises): Part II: Superfluidity, Part III: Density operator
9	October 29, 2024	**Part IV: Intro to Nonequilibrium Stat. Phys.** L12: H-theorem and relaxation to equilibrium Monte Carlo simulations: Detailed balance, MC sampling, Metropolis algorithm, simulated annealing	November 1, 2024	HOLIDAY
10	November 5, 2024	L13: Brownian motion, diffusion and Langevin equation	November 8, 2024	T5: Diffusion equation
11	November 12, 2024	L14: Fokker-Planck equation, velocity relaxation and generalized diffusion equation, Boltzmann equation?	November 15, 2024	**Part V: Quantum Stat. Phys.: Linear response, noise** L9: Generalized dynamical susceptibility, Linear response theory, Kubo formula
12	November 19, 2024	**Test 3** (theory + exercises): Part IV: Detailed balance, Langevin eq., diffusion eq.	November 22, 2024	L10: Time dependent correlations, classical noise, quantum noise
13	November 26, 2024	L11: FDT, classical limit, Onsager's regression hypothesis, Johnson noise of resistive circuits	November 29, 2024	University Open Day
14	December 3, 2024		December 6, 2024	**Test 4** (theory only): Part V: Linear response, Kubo formula, noise
15	December 10, 2024		December 13, 2024	**Test Retake** (2 out of 7)