

School of Mathematics**Course 443, Statistical Physics**

2005–06

(JS, SS Theoretical Physics, SS Mathematics, SS Two-subject Moderatorship)

Lecturer: Dr. Sinéad Ryan**Requirements/prerequisites:** 241**Duration:** 21 weeks**Number of lectures per week:** 3**Assessment:** Regular tutorials and assignments**End-of-year Examination:** One 3-hour examination**Description:** See <http://www.maths.tcd.ie/~ryan/teaching.443.html> for additional information.

Brief review of thermodynamics. Canonical/Grand Canonical ensembles. Applications to Perfect Gas and one dimensional Ising Model. Non Ideal Gas, the cluster expansion and virial coefficients. Quantum statistical mechanics. Fermi Dirac and Bose Einstein statistics for non-interacting particles. Applications: Fermi Dirac Gas, Bose Einstein Condensations. Chemical Reactions. Applications to Astrophysics, Superfluidity, Phase Transitions, Landau Theory. Ideas of Symmetry Breaking. Linear Response Theory. Numerical methods.

Textbooks:

1. L.D. Landau and E.M. Lifshitz, Statistical Physics
2. K. Huang, Statistical Mechanics
3. W. Griener, L. Niese and H. Stocker, Thermodynamics and Statistical Mechanics
4. S.K. Ma, Statistical Mechanics
5. L.E. Reichl, A Modern Course in Statistical Physics

March 3, 2006