**Scuola di Dottorato del Politecnico di Bari**

**Ph.D. School**

**Introduction to statistical mechanics and applications**

**CFU: 3 (24 ore)**

**SSD: MAT/07: Fisica Matematica**

THERMODYNAMICS

Thermodynamic Potentials; Free Energy; Entropy; Equations of State.

POSTULATES AND ENSEMBLES

Phase Space; Observables; Probability distribution; Micro-canonical, canonical and grand-canonical ensembles, partition function.

INTRODUCTION TO PHASE TRANSITIONS

Critical points; Universality and scaling; Correlation functions; Symmetry breaking and order parameter; Ising model: solution in one and two dimensions, mean field solution.

ADVANCED TOPICS

Polymers; Random ferrimagnets; Optimization.

References

K. Huang: Statistical Mechanics, John Wiley & Sons (1987)

J. P. Sethna: Statistical Mechanics: Entropy, Order Parameters, and Complexity, Oxford University Press (2006)

L. Peliti: Statistical Mechanics in a Nutshell, Princeton University Press (2011)