

School of Mathematics

Course 446 — Topics in Theoretical Physics (Statistical Mechanics)

2002-03

(SS Theoretical Physics
JS & SS Mathematics)

Lecturer: Professor T. Dorlas

Requirements/prerequisites: Linear algebra (eg 211), some probability

Duration: 21 weeks

Number of lectures per week: 3 hours per week, likely to be in one block and held at the Dublin Institute for Advanced Studies, 10 Burlington Road

Assessment:

End-of-year Examination: End of year exam, 3 hours, may be held earlier than usual exams.

Description:

This is a new course, and will be offered also to UCD students. That may place restrictions on the timing of the exam.

1. Basic Statistical Mechanics. Models for magnetism and fluids. Critical exponents.
2. Transfer Matrix Solution of the One-Dimensional Ising Model.
3. The Mean-Field Weiss-Ising Model.
4. The Spherical Model.
5. Star-Triangle Transformation.
6. The 2-Dimensional Ising Model: Graphical Solution.
7. The 2-Dimensional Ising Model: Algebraic Solution.
8. The 2-Dimensional Ising Model: Commuting Transfer Matrices.
9. The 6-Vertex Model and the Bethe Ansatz.
10. The 6-Vertex Model: Commuting Transfer Matrices.

September 25, 2002