

STATISTICAL PHYSICS

WINTER 2010

There will be lectures following Daniel Schroeder's book on Mondays and Wednesdays, and problem sessions on Fridays.

NB: The lecture on February 19 is moved to February 18 at 13.15 in FB55.

We go through the chapters of the book according the following outline:

January 18, 20 Introduction

January 25, 27 Schroeder chapter 6

February 1, 3, 8 Schroeder chapter 7

February 10 Schroeder chapter 8.1

February 15 Schroeder chapter 5.3

February 17 Schroeder chapters 7.6, 8.2

February 22 Ising model demonstration

February 24 Summary of the course

February 26 Exam.

Which means that the problem sessions are on January 22, 29 and February 5, 12, and 18. See next page for the problems.

The lectures are in FB41, at 13.15 on Mondays, 8.15 on Wednesdays, and at 10.15 on Fridays. The exam is in FR4. Problem solving is an essential part of the lectures; the precise problems to be discussed are given as we proceed.

For the students there are seven possible grades, "excellent", "very good", "good", "satisfactory", "enough", "not enough", and "not even close".

"Kursforum": Complaints can be directed directly to me, or to Olga Bessidskaia or Thomas Kvorning who will inform me about them halfway through the course.

My office is A5:1057. I am happy to discuss statistical physics with visitors.

PROBLEMS TO BE DISCUSSED

January 22:

Suppose

$$S = S(U, V) = N \ln \left[\frac{V - bN}{N} \left(\frac{U + \frac{aN^2}{V}}{N} \right)^{\frac{3}{2}} \right] + c_0 N . \quad (1)$$

Work out the equation of state (a relation between pressure, temperature, and volume). What is this?

Starting from the energy $U = U(S, V)$, use Legendre transformations to derive Helmholtz' free energy F , Gibbs' free energy G , and the enthalpy H . If you are a physicist studying boiling water, which potential do you choose, and why? If you are chemist mixing some ingredients in a test tube, which potential do you choose, and why?

Schroeder, exercise B.15. Why do we want to know this?

January 29

Schroeder, exercises 6.19, 6.20, 6.22, 6.32, 6.41.

February 5

Schroeder, exercises 6.50, 7.6, 7.22, 7.23.

February 12

Schroeder, exercises 7.14, 7.41, 7.44, 1.17c.

February 18

Schroeder, exercises 5.54, 5.55a-c, 7.45, 7.66, 7.73