

The Hebrew University of Jerusalem

Syllabus

Intro. to Statistical Physics - 77307

Last update 06-10-2021

HU Credits: 4

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Physics

<u>Academic year:</u> 0

<u>Semester:</u> 1st Semester

<u>Teaching Languages:</u> Hebrew

<u>Campus:</u> E. Safra

Course/Module Coordinator: Dr Shmuel Balberg

Coordinator Email: shmblbrg@phys.huji.ac.il

<u>Coordinator Office Hours:</u> Wednesdays 10-11 (by appointment)

Teaching Staff:

Prof Maxim Khodas, Mr. Simon Shahar

Course/Module description:

The course covers the braod field of statistical physics of systems under thermal equilibrium.

Course/Module aims:

The aim is to provide knowledge and insight and abilities in the theoretical methods.

Learning outcomes - On successful completion of this module, students should be able to:

The students will be able to implement the theoretical methods in calculating thermodynamic quantities and microscopic probability distributions of systems.

Attendance requirements(%):

none

Teaching arrangement and method of instruction: The teaching methods include frontal lectures, recitation sections and homework sets.

Course/Module Content:

1) Introduction – the laws of thermodynamics, the main assumptions of statistical mechanics.

2) Micro canonical distribution, canonical distribution,

partition function and the implementation to thermodynamics.

3) Examples: two level systems, classical ideal gas, para magnetism, vibrations of atoms in a lattice.

4) Ising model – numerical project.

5) Classical ideal gas with internal degrees of freedom.

- 6) Grand canonical distribution.
- 7) Quantum partition function in the grand canonical distribution.

8) Ideal gas of fermions: non-relativistic, relativistic and the temperature dependence.

9) Ideal gas of bosons: black body, Bose Einstein condensation.

Required Reading:

The students are referred to reading material in the weekly homework sets.

<u>Additional Reading Material:</u> Textbooks in English:

- 1) Schroeder, Thermal Physics
- 2) Kennett, Essential Statistical Physics

Grading Scheme:

Additional information:

Further details about the course format and grade policies will be determined according to teaching procedures during Covid restrictions.