Course Profile - Department of Physics

Course Number : PHYS 344	**Course Title :** Statistical and Thermal Physics
Required / Elective : Required	**Pre / Co-requisites :** -
Catalog Description: Basic probability concepts, elementary kinetic theory, classical microcanonical, canonical and grand canonical ensembles, classical ideal gas, equipartition of energy, quantum mechanical ensembles, ideal Fermi and Bose systems, black body radiation, phonons, the electron gas, magnetism, introductory nonequilibrium statistical physics.	**Textbook / Required Material :** Federick Reif, *Fundementals of Statistical and Thermal Physics*, McGraw-Hill International Edition, 1985.
Course Structure / Schedule : (3+0+2) 4 / 8 ECTS	
Extended Description : Introduction to basic probability concepts. Statistical description of systems of particles. Statistical thermodynamics. Macroscopic parameters and their measurement, Simple applications of macroscopic thermodynamics. Basic methods and results of statistical mechanics. Equilibrium between phases or chemical species. Quantum statistics of Ideal gasses. Systems of Interacting particles. Elementary Kinetic Theory of Transport Processes.	
Design content : None	**Computer usage**: Students use computational and graphics software in studying the probability distribution functions.

Course Learning Outcomes [relevant program outcomes in brackets]**:**

On successful completion of this course students will be able to

1. distinguish between microscopic and macroscopic systems;
2. demonstrate knowledge of basic probabilistic description of macroscopic systems;
3. perform statistical analysis on simple systems such as the ideal gas to derive macroscopic general statements of thermodynamics;
4. recognize the interrelation between microscopic and macroscopic description of systems;
5. state the laws of classical thermodynamics, and apply them to simple problems;
6. elucidate the differences in the descriptions of systems consisting of distinguishable and indistinguishable particles;
7. discuss elementary concepts in non-equilibrium statistical mechanics.

Recommended reading

1. Kittel, C., Kroemer, H., *Thermal Physics, 2nd edition*, Freeman, New York, 1980.
2. Feynman, R.P., Leighton, R.B., Sands, M. *The Feynman Lectures on Physics, Volume I*, Addison Wesley, 1977.

Teaching methods

Lectures and exercise sessions of approximately 5 hours per week; pre-readings and homework problems.

Assessment methods (Related to course outcomes)**:**

Two mid-term examinations, a final examination, weekly homework assignments, and quizzes.

Student workload:

Pre-reading	7 hrs
Lectures, discussions	45 hrs
Exercise sessions	30 hrs
Homework	40 hrs
Independent work	73 hrs
Laboratory work	0 hrs
Examinations	5 hrs

TOTAL …… 200 hrs … to match 25 x 8 ECTS

Prepared by : İsmail Karakurt , 01.02.2010	**Revision Date :**