PHYSICS 5305
Statistical Physics (Spring 2013)

Schedule: MWF, 12:30-1:50 in Sci 204
Instructor: Mahdi Sanati, m.sanati@ttu.edu
Office and office hours: Sci 46, open door policy

Course Objectives and Coverage: This is a course for graduate students in physics. It is also open to interested students in engineering, chemistry, mathematics, and other fields. The purpose of this course is to introduce students to introduction to probability, statistical mechanics, and thermodynamics. Specific topics in probability include random variables, joint and conditional probability densities, and functions of a random variable. Concepts in statistical mechanics include macroscopic variables and thermodynamic equilibrium, fundamental assumptions of statistical mechanics, and microcanonical, canonical, and grand canonical ensembles. First, second, and third laws of thermodynamics. Numerous examples illustrating a wide variety of physical and biologocial phenomena such as magnetism, polyatomic gases, thermal radiation, electrons in solids, intracting systems, Ising model, and protein folding.

Expected Learning Outcomes: After completing this course students should (1) have a working knowledge of the foundations, techniques and key results of statistical mechanics and thermodynamics; (2) be able to comprehend their basic applications at the research level, e.g., in research articles; (3) be able to read any other related statistical and thermal physics material as they need it.

Text: "*Statistical Mechanics*", by Pathria and Leale, Academic Press, Third Edition. We will follow the material from the textbook, but departures from it occur frequently. Therefore, I encourage you to take notes. Other references: *Statistical Mechanics* by Kubo, and *Statistical Physics Part 1* by Landau and Lifshitz.

Learning Assessment: Certain problems on the exams will explicitly require facility with the course objectives and be used as learning assessments tools.

Homework: Problem sets are assigned for each chapter. Part of these problems will be used in your exams. The grades on your exams reflect how well you can do the homework problems on your own.

Exams: three midterm exams (25% each), final exam (25%)

Grades: 100-A-88, 87.9-B-76, 75.9-C-64, 63.9-D-50, 49.9-F-0

Attendance: Required, except for excused emergencies. Each recorded absence and late arrival to the lecture counts as –5% and will be deducted from the course total.

Disability: Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, you may contact the Student Disability Services office in 335 West Hall or 806-742-2405.