Physics 265 – Thermal & Statistical Physics – Spring 2018

Instructor:

Dr. Juan M. Vanegas
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Office: W428, Discovery Hall
Office hours: MW 2:30 pm – 3:30 pm

Schedule:

Lectures: MWF 1:10 – 2:00 pm, Rowell 115
Midterm exam: Wednesday March 7th, 1:10 – 2:00 pm, Rowell 115
Final exam: TBA

Prerequisites:

Phys 152 or Phys 125 (or equivalent), and Math 121 (Vector Calculus)

Course textbook:

Thermal Physics, 2nd edition (1980, Macmillan).
Authors: Charles Kittel and Herbert Kroemer.
ISBN: 978-0-7167-1088-2

Additional references:

Thermodynamics and Statistical Mechanics: An Integrated Approach (2015, Cambridge University Press).
Author: M. Scott Shell
ISBN: 978-1-107-65678-9 (paperback), 978-1-107-01453-4 (hardback)
http://dx.doi.org/10.1017/CBO9781139028875

An Introduction to Thermodynamics and Statistical Mechanics, 2nd edition (2007, Cambridge University Press).
Author: Keith Stowe
ISBN: 978-0-521-86557-9
http://proquest.safaribooksonline.com/9781139814157?uicode=uvermont

A Student's Guide to Entropy (2013, Cambridge University Press).
Author: Don S. Lemons
ISBN: 978-1-107-01156-4
http://proquest.safaribooksonline.com/9781107460614?uicode=uvermont

Molecular Driving Forces, 2nd edition (2010, Garland Science).
Authors: Ken Dill and Sarina Bromberg
ISBN: 978-0-8153-4430-8

Grading:

The grade for the class will be computed based on weekly homework assignments (40 %), a midterm exam (25 %), a final exam (25 %), and in-class attendance/participation (10 %).

Homework:

Homework assignments will be assigned every Friday and will be due the following Friday at the beginning of lecture. Students are encouraged to work together, but you must write and turn in your own homework. Academic dishonesty will not be tolerated! No late assignments will be accepted.

Course plan (order and specific topics may change):

1. Model two-state systems and the multiplicity function.
2. Entropy and temperature.
3. Boltzmann distribution and free energy.
4. Thermal radiation and Planck distribution.
5. Chemical potential and Gibbs distribution.
6. Ideal gas.
7. Fermi and Bose gases.
8. Heat and work.
9. Gibbs free energy and chemical reactions.
10. Phase transformations and binary mixtures.
11. Cryogenics.
12. Semiconductor statistics.
13. Kinetic theory.
14. Diffusion and thermal conduction.
15. Thermostatistics of biological systems.