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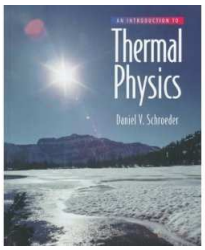
PHYS 320
Thermal Physics
Lawrence University – Winter 2013

(LECTURE) **Youngchild 115, MWF 8:30a – 9:40a**

Instructor: **Rob Salgado** **Visiting Assistant Professor of Physics** Office: **Youngchild 111** Voice: **(920)-993-6083**	Email (the best way to contact me): **roberto.b.salgado@lawrence.edu** Instant-Messengers: lawphyrob on instant-messaging AOL, Yahoo, Skype, Google, and WindowsLive [as lawphyrob@hotmail.com] (IM only… do *not* email here—I won't read it)	Office hours: ****to be announced****

Catalog Description:

PHYS 320 –Thermal Physics
Treats elementary statistical mechanics, Bose-Einstein and Fermi-Dirac statistics, kinetic theory, and classical thermodynamics.
Units: 6. Prerequisite: PHYS 160 (Modern Physics) and 225 (Computational Mechanics) and MATH 210 (Differential Equations with Linear Algebra)



Required Materials:

"An Introduction to Thermal Physics" by Daniel V. Schroeder (Addison Wesley/Pearson, 1999). ISBN 0201380277

Electronic Materials:

I will maintain a Moodle website (**http://moodle.lawrence.edu/course/view.php?id=5782**)
that links to homework assignments, electronic-whiteboard notes, and handouts. (These materials are not a substitute for regular attendance, participation, and problem-solving.)

Course Goals:

- To further develop concepts in thermal physics,
  especially by relating macroscopic thermodynamics to the more-fundamental large-number microscopic statistical-mechanics.
- To reinforce important concepts in physics and mathematics.
- To further develop physical intuition, mathematical reasoning, and problem solving skills.
- To further prepare students for the necessarily rigorous sequence in physics, mathematics, engineering, and other physical sciences.

Grades are roughly weighted as follows:

35% HOMEWORK
15% HOMEWORK PRESENTATION (during the term, each student will make two presentations to the class [details to be arranged])
20% MIDTERM EXAM (open notes, open-text, take-home, no real or virtual human interaction)
30% cumulative FINAL EXAM (required to pass the course, open notes, open-text, take-home, no real or virtual human interaction)

Homework (assigned weekly, is due in "THE BOX" by the end of class on Fridays):

Homework will be assigned, collected, and graded. (Late homework may be penalized.) Most of the learning you do in this course is done by your doing homework problems outside of class! (I am merely a guide for you.) You are strongly encouraged to discuss the homework with other students. However, be sure that you can do the homework by yourself and that you present your own work. Significant assistance from other students should be briefly acknowledged in your homework submission. You can always ask me for help after you have made an honest effort. You are also encouraged to learn to use computational tools (like Maple or Python) to help you perform or check calculations and create visualizations.

I have tentatively marked four Fridays [Jan 18, Feb 1, Feb 22, and Mar 8] for Homework Presentations. [Details to be arranged.]

Rough list of topics (closely following Schroeder):

- Fundamentals (January)
  - Energy [and Heat and Work] (Ch 1.1-1.6 [skip 1.7])
  - Entropy [and combinatorics] (Ch 2)
  - Interactions and Implications [Temperature] (Ch 3)
- [Applied] Thermodynamics (first two weeks in February)
  - Heat Engines and Refrigerators (Ch 4.1-4.2 [skip 4.3-4.4])
  - Free Energy and Phase Transformations (Ch 5.1-5.3 [skip 5.4-5.6]) *[if needed, this may be rescheduled to the end or skipped]*
- Statistical Mechanics (mid-February to the end of the term)
  - Classical (Boltzmann) Statistics (Ch 6)
  - Quantum (Bose-Einstein and Fermi-Dirac) Statistics (Ch 7)