

Syllabus Physic 420, Thermal Physics

Textbooks

1. *Thermal Physics* by Kittel & Kroemer, 2nd edition (required)
2. *Thermal Physics* by Baierlein (optional reference)

Approach

Thermal Physics by Kittel & Kroemer clearly explains the logic behind the central concepts of thermal physics such as entropy, temperature, Boltzman distribution, Gibbs distributions, and chemical potentials. The book also contains applications of these concepts to a variety of systems, including ideal gas, Fermi and Bose gases, heat and work, etc. The course will closely follow the presentation of the book.

Thermal Physics by Baierlein is a relatively new textbook, which presents the key concepts in a more traditional way. The book contains fairly accessible explanations of the concepts that utilizes the knowledge of heat and work presented in the general physics courses. The book also contains applications of thermal physics to recent developments, such as the experimental realization of Bose-Einstein condensation. The book contains many examples and problems that would be useful for further understanding the concepts. We will draw some materials from this book from time to time.

Outline

1. Entropy and temperature
2. Boltzman distribution and Helmholtz free energy
3. Thermal distribution and Planck distribution
4. Chemical potential and Gibbs distribution
5. Ideal gas
6. Fermi and Bose gases
7. Heat and work
8. Gibbs free energy and chemical reactions
9. Phase transformations
10. Kinetic enegery
11. Propagation

Grading Policy

Homework 30%, Midterm 30%, Final 40%

Office Hours

Tuesdays 1:20 – 2:20 pm, Zoom & in person, location to be determined

Academic Integrity

All Penn State Policies regarding ethics and honorable behavior apply to this course. Academic integrity is the pursuit of scholarly activity free from fraud and deception and is an educational objective of this institution. All University policies regarding academic integrity apply to this course. Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating of information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations or homework solutions, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. For any material or ideas obtained from other sources, such as the text or things you see on the web, in the library, etc., a source reference must be given. Direct quotes from any source must be identified as such. All exam answers must be your own, and you must not provide any assistance to other students during exams. Any instances of academic dishonesty WILL be pursued under the University regulations concerning academic integrity. Read more at <http://www.psu.edu/ufs/policies/>.

Course materials are strictly for this class only. Please do not distribute course materials.

For homework, discussions among students are encouraged. However, you must write your own work. You are not allowed to look at solutions of others, including your classmate's or those from the Internet or by any other means.

Disability Statement

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In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <http://equity.psu.edu/ods/doc-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. You must follow this process for every semester that you request accommodations.