MAT 501 Thermodynamics
Fall 2023

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Course Data: Hours: Mon 09.40-11.30/Tue 14.40-16.30
Office hours: By appointment

Textbooks:

A number of other online resources will also be shared when needed.

Grading
Midterm: 30% (Around the 8th or 9th week)
HWs: 30% (About 1 HW every 2 weeks)
Final exam: 40% of the final grade; may or may not cover all the material
Note: Regular attendance to lectures will be taken as a sign of interest and may result in changing of grades in favor.

Distribution of topics among the weeks (Lectures will be physical unless stated by myself or the TA otherwise)

Week 1-2
1. Thermodynamic system definitions
2. Types of energy
3. Relations between different energies, 1st law
4. Examples (gas-piston model)

Week 3-4
1. Entropy and reversibility, 2nd law of thermodynamics
2. Relation between entropy and first law
3. Definition of fundamental equation
4. 3rd law of thermodynamics
5. Thermodynamic potentials

Week 5-8
1. Maxwell relations, its applications to gases and condensed matter
2. Equilibrium and unary systems
3. Equilibrium and binary systems
4. Introduction to phase transitions
5. Thermodynamics of non-reacting systems (solutions)

Week 9-10
1. Max. work theorem
2. Ideal gas and real gas comparison
3. Introduction to thermodynamic cycles
4. Examples (energy conversion and efficiencies)
5. Joule-Thomson effect

Week 11-12
1. Irreversible thermodynamics (fluxes and relations between them)
2. Examples and discussion

Week 13-14
1. Thermodynamics of various systems
2. Examples and discussion