

PHYS 125 Soft Matter Physics for Non-physicists Fall 2018 MW 11:30 am-12:20 pm

Course Description: Soft matter physics in action with hands-on physics experience in simple experiments for non-physics majors; introduction to thermodynamics and soft matter physics; heat, temperature, thermodynamic efficiency, phase transitions, mechanical properties of soft matter, heat transfer mechanisms; physical measurements.

Prerequisites: None. **Learning Outcomes:** Upon completion of this course the student will understand the basic laws and concepts of thermodynamics and soft matter physics and will be able to apply them to real world problems.

Instructor: Igor Lyuksyutov **Web page:** cooking.physics.tamu.edu **Email :** lyuksyutov@tamu.edu **Office:** MPHY 452 **Office Hours:** T 1pm – 2pm and by appointment

Required: clicker

Texts: Class Notes, OpenStax: https://d3bxy9euw4e147.cloudfront.net/oscms-prodcms/media/documents/CollegePhysics-OP_uZAa600.pdf (ch13-ch15), Khan Academy <https://www.khanacademy.org/science/physics/thermodynamics>

Grading: Midterm exam 20%, Final exam 30%, Labs 40% Class work 10%

Scale: A 90-100, B 80-89, C 70-79, D 50-69, F 0-49. Grades may be curved upward.

You must achieve 70% or better in the laboratory in order to pass the course.

Syllabus:

Wk	Date	Topic
1	Aug. 27	Introduction
	Aug. 29	The basics of Thermodynamics I
2	Sept. 3	The basics of Thermodynamics II
	Sept. 5	The basics of Thermodynamics III
	Lab	Introduction, safety training.
3	Sept. 10	Heat transfer I
	Sept. 12	Heat transfer II
	Lab	Lab 1. Heat conduction, part 1.
4	Sept. 17	Phases, phase transitions and phase diagrams I.
	Sept. 19	Phases, phase transitions and phase diagrams II.
	Lab	Lab 1. Heat conduction, part 2.
5	Sept. 24	Gels. Physical properties and phase transitions I
	Sept. 26	Gels. Physical properties and phase transitions II
	Lab	Lab 2. Gel Properties, part 1.
6	Oct. 1	Gels. Physical properties and phase transitions III
	Oct. 3	Thermodynamics of solutions
	Lab	Lab 2. Gel Properties, part 2.
7	Oct. 8	Thermodynamics and heat conduction: Problem solving

	Oct. 10	Midterm Exam
	Lab	Make-up lab
8	Oct. 15	Phase transitions and tempering I.
	Oct. 17	Phase transitions and tempering II.
	Lab	Lab 3. Phase transitions and tempering, part1.
9	Oct. 22	Phase transitions and tempering III.
	Oct. 24	Membranes physical properties I.
	Lab	Lab 3. Phase transitions and tempering, part2.
10	Oct. 29	Membranes physical properties II
	Oct. 31	Membranes physical properties III
	Lab	Lab 4. Membranes, part 2.
11	Nov. 5	Emulsions and foams I.
	Nov. 7	Emulsions and foams II.
	Lab	Lab 4. Membranes, part 2.
12	Nov. 12	Physics of Ice and Water I.
	Nov. 14	Physics of Ice and Water II.
	Lab	Make-up lab
13	Nov. 19	Physics of Ice and Water III.
	Nov. 21	Reading day
	Lab	No
14	Nov. 26	Review
	Nov. 28	Review
	Lab	Make-up lab
15	Dec. 5	Review
	Lab	Make-up lab

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