

PHYS 3705 - Thermodynamics and Classical Statistical Mechanics

Fall 2026 Syllabus, Section 02, CRN 41252,

Credit hours: 3

Instructor

Snjezana Balaz

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How to Refer to me:

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Public Instructor Information

Instructor Title: Chair and Associate Professor

Instructor Professional Qualifications: Ph.D. Chemical and Materials Engineering, University of Nebraska-Lincoln, Lincoln, NE (2007); M.S. Physics, University of Nebraska-Lincoln, Lincoln, NE (2005); B.S. Physics, Northland College, Ashland, WI (2001)

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Course Description

3705. Thermodynamics and Classical Statistical Mechanics. Principles and theorems of thermodynamics derived from the observable macroscopic properties related to temperature, heat, and the underlying statistical origins of thermodynamic processes. Includes the laws of thermodynamics, entropy, state functions, differential equations of state, Maxwell relations, and Maxwell-Boltzmann statistics. Prereq.: PHYS 2611 or ECEN 2633 and prerequisite or concurrent with MATH 2673 or MATH 2673H. 3 s.h.

Course Readings

Group	Title	Author	ISBN
Required	Unit T: Some Processes are Irreversible, Six Ideas that Shaped Physics, 4th Edition, McGraw-Hill, 2003	Thomas A. Moore	
Optional	Volume 1 Physics for Scientists and Engineers	R. A. Serway and J. W. Jewett	

Volume 1 Physics for Scientists and Engineers, by R. A. Serway and J. W. Jewett, 8th ed. (Thomson/Brooks-Cole) 2010, or any calculus based introductory text for chapters on fluids, heat and thermodynamics (usually five chapters total) could be helpful. That's why it is optional.

The course readings are subject to change in the event of extenuating circumstances, research developments, current events, and/or to ensure better learning.

Material Covered and Tentative Schedule

Week of	Proposed Topic	Due/To Prepare for Class
8/24	Ch 0 Conservation Laws and Intro to Thermo	Due 8/26 at 8am: SB: T0 Conservation Laws and Introduction to Thermodynamics Due 8/28 at 8am: SB: T1 Core: Temperature
8/31	Ch 1 Temperature	

9/7	Energy Transfer by Heat	
9/14	Exam 1 (W 9/16 Ch0[S+J] and Ch1) Ch 2 Macrostates and Microstates	Due 9/16 at 8am: Chapter 0 Homework Chapter 1 Homework Calorimetry Lab Due 9/18 at 8am: SB: T2 Core: Macrostates and Microstates
9/21	Ch 3 Entropy and Temperature	Due 9/21 at 8pm: SB: T3 Core: Entropy and Temperature
9/28	Ch 4 The Boltzmann Factor	Due 9/28 at 8am: SB: T4 Core: The Boltzmann Factor
10/5	Exam 2 (W 10/7 Ch2-4) Ch 5 The Ideal Gas	Due 10/7 at 8am: Chapter 2 Homework Chapter 3 Homework Chapter 4 Homework Due 10/9 at 8am: SB: T5 Expansion: The Ideal Gas
10/12	Ch 6 Molecular Motion in Gases Ch 7 Photon Gas	Due 10/14 at 8am: SB: T6 Molecular Motion in Gases SB: T7 Photon Gases
10/19	Ch. 8 Gas Processes	Due 10/19 at 8am: Chapter 7 Homework SB: T8 Expansion: Gas Processes
10/26	Exam 3 (W 10/28 Ch 5-8) Ch 9 Calculating Entropy Changes	Due 10/28 at 8am: Chapter 5 Homework Chapter 6 Homework Chapter 8 Homework Gas Properties Due 10/30 at 8am: SB: T9 Expansion: Calculating Entropy Changes
11/2	Ch 9 Calculating Entropy Changes	
11/9	Ch 10 Heat Engines	Due 11/9 at 8am: SB: T10 Expansion: Heat Engines
11/16	Ch 10 Heat Engines	
11/23	Thermodynamic Potentials	
11/30	Phases Exam 4 (W 12/2 Ch 9-10+)	Due 12/2 at 8am: Chapter 10 Homework Which of these devices are heat engines? Due 12/3 at 11:59pm: Chapter 9 Homework Due 12/4 at 8am: SB:T11 Expansion: The Physics of Climate Change Due 12/4 at 8pm: Chapter 11 Homework
12/7	OPTIONAL! Reassessments (M 12/10 All)	

The course schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better learning.