CH365 Chemical Engineering Thermodynamics

Lesson 8
Review

Professor Andrew Biaglow

WPR1

10 September 2025

(laptops for reference only)

CADET _____ SECTION _____ TIME OF DEPARTURE _____

DEPARTMENT OF CHEMICAL & BIOLOGICAL SCIENCES & ENGINEERING

CH365 2025-2026
WRITTEN PARTIAL REVIEW I
10 September 2026, A-Hour

TEXT: Smith, Van Ness, Abbott & Swihart
SCOPE: Lessons 1-8

References Permitted: Open note, book, and computer. You may not share files or communicate with people or AIs in any way during the exam.

INSTRUCTIONS

1. You will have 55 minutes to complete the exam.
2. Do not mark the exam or open it until "begin work" is given.
3. There are 3 problems on 5 pages (not including the cover page). Write your name on the top of each sheet. Answer all questions.
4. Solve the problems in Mathematica or in the space provided. Show work to receive partial credit.
5. When finished, upload Mathematica files to CANVAS.

(TOTAL WEIGHT: 200 POINTS)

DO NOT WRITE IN THIS SPACE

PROBLEM	VALUE	CUT
A	60	
B	70	
C	70	
TOTAL CUT		
TOTAL GRADE	200	

L1-3 Objectives

Lesson 1: Fundamentals 1

1. Describe the scope and limitations of thermodynamics.
2. Define the units used to express amount of substance and force.
3. Convert temperature between the different temperature scales.
4. Analyze readings from a dead-weight gauge.
5. Perform calculations using both FPS and SI systems of units.

Lesson 2: Fundamentals 2

1. State the thermodynamic definitions of work, energy & heat and be able to discuss them.
2. Describe the energy conservation principle and how this leads to the mechanical energy balance.
3. Compute work and energy changes for a piston.
4. Describe the driving force for the transfer of heat.
5. Perform calculations involving heat, work, and energy in the SI and FPS unit systems

Lesson 3: Review

L4-7 Objectives

Lesson 4: Internal Energy, Energy Balances, & State Functions

1. Describe Joule's experiments.
2. Describe the relationship between internal energy and heat and work.
3. State the first law of thermodynamics in word and equation form.
4. Use concepts of thermodynamic state and state functions to calculate heat, work, and internal energy associated with changes of state (see Examples 2.3, and 2.4).

Lesson 5: Equilibrium, Reversible Processes & Enthalpy

1. Describe equilibrium in thermodynamic systems.
2. Be able to describe and discuss reversible processes (see Example 2.5).
3. Write energy balances for constant-volume and constant-pressure systems.

Lesson 6: Enthalpy, Heat Capacity, and Open Systems 1

1. Calculate enthalpy change when the amount of heat added to the system is known (see Example 2.6).
2. Calculate changes in internal energy, heat, and work in a cyclic process (Problem 2.6).
3. Calculate changes in state using heat capacity.
4. Perform calculations in both English and SI units.

Lesson 7: Enthalpy, Heat Capacity, and Open Systems 2

1. Write mass and energy balances for open systems.
2. Calculate flow rate in a conduit from velocity, cross-sectional area, and density.