

UNIVERSITY OF HOUSTON
Department of Civil and Environmental Engineering

ENGI 2334: Introduction to Thermodynamics
(Usually taught by me each Spring Semester)

Catalog data and description:	ENGI 2334: Cr. 3. (3-0). Fundamental concepts, thermodynamic systems and applications, heat and work, properties of pure substances, first and second laws of thermodynamics.
Course objectives:	<ol style="list-style-type: none">1. Help engineering students learn how to solve problems in a systematic and organized fashion.2. Learn fundamental concepts of thermodynamic systems, heat and work, and properties of pure substances.3. Apply the first and second laws of thermodynamics to power, heat, and refrigeration systems.
Professor:	Dr. Shankar Chellam, Assistant Professor of Environmental Engineering
Required textbook:	<i>Fundamentals of Thermodynamics</i> , by Sonntag, R.E., Borgnakke, C., and Van Wylen, G.J. 5 th Edition, John Wiley & Sons, 1998.
Prerequisites by topics:	<ul style="list-style-type: none">• Chemistry including fundamental laws, atomic and molecular structure, states of matter, equilibrium, kinetics, and elementary inorganic and organic chemistry. (CHEM 1332 and CHEM 1112)• Calculus of functions of several variables, vector valued functions, partial differentiation, and multiple integrals. (MATH 2433)• Engineering physics including one and two dimensional motion, statics and dynamics, potentials, energy and momentum conservation, collisions, rotational kinematics, oscillations, and gravitation. (PHYS 1322)
Topics:	<ul style="list-style-type: none">• Introduction<ul style="list-style-type: none">○ Various cycles and thermodynamic systems○ Control volume○ Thermodynamic properties and units○ Zeroth law• Properties of a pure substance<ul style="list-style-type: none">○ Phase equilibria○ Independent properties○ Vapor phase equations of state for a simple substance○ Tabular representation of thermodynamic properties• Work and heat<ul style="list-style-type: none">○ Definitions○ Work calculations involving compressible systems○ Heat transfer modes• First law of thermodynamics<ul style="list-style-type: none">○ Statement for a control mass undergoing a cycle○ Statement for a control mass undergoing a change in state○ Internal energy, specific heat, and enthalpy• Second law of thermodynamics<ul style="list-style-type: none">○ Heat engines and refrigerators○ Irreversible processes○ Carnot cycle• Entropy<ul style="list-style-type: none">○ Clausius inequality○ Entropy changes in reversible and irreversible processes○ Reversible polytropic processes