

ME 305: Engineering Thermodynamics I
Fall and Spring Semesters

Type (check one):	Required: <input checked="" type="checkbox"/> Elective: <input type="checkbox"/>
2005-2006 Catalog Data:	Fundamental laws and basic development of the classical macroscopic approach to thermodynamics. First and second laws, state relations, cycles. Applications to engineering systems. <i>One semester; three credits</i>
Prerequisites:	MATH 132, PHYS 150
Co-Requisites:	None
Textbook:	R. Sonntag, C. Borgnakke & Gordon Van Wylen,, <i>Fundamentals of Thermodynamics</i> , Sixth Edition, John Wiley & Sons, N.Y.,N.Y., 2002.
Other Required Materials:	None
Other References:	None
Instructor:	Dr. Ray W Brown, Professor of Mechanical Engineering
Course Objectives:	<ol style="list-style-type: none">1. Develop understanding of thermodynamic properties, states, and substance models2. Develop understanding of reversible and irreversible thermodynamic processes and cycles3. Develop understanding of first and second laws of thermodynamics for closed and open systems
Prerequisites by Topics:	<ol style="list-style-type: none">1. Differential and integral calculus2. Basic physics: work, energy, dissipation
Topics:	<ol style="list-style-type: none">1. Systems and control volumes2. Mechanical, thermal, chemical equilibrium3. Processes and cycles4. Substance models: incompressible / ideal gas / pure substance5. Thermodynamics surfaces: tables, graphs, software6. Work7. Heat8. Internal energy and the first law9. First law for streaming fluids; enthalpy10. Steady-state, steady-flow; uniform-state, uniform-flow11. Entropy and the second law12. Heat engines, heat pumps, Carnot cycle13. Property relationships
Class Schedule:	Three 50-minute sessions per week

Prepared by: Dr. Ray W Brown

Date: 24-Aug-05

**Professional Component:
ME 305 – Engineering Thermodynamics I**

Category (check one)	<input checked="" type="checkbox"/> Math/Basic Science <input type="checkbox"/> Engineering <input type="checkbox"/> General Education <input type="checkbox"/> Other
Design (check one)	<input checked="" type="checkbox"/> Significant <input type="checkbox"/> Some <input type="checkbox"/> None
Realistic Constraints (check all that apply)	<input checked="" type="checkbox"/> Economic <input type="checkbox"/> Environmental <input type="checkbox"/> Sustainability <input type="checkbox"/> Manufacturability <input type="checkbox"/> Ethical <input type="checkbox"/> Health & Safety <input type="checkbox"/> Social <input type="checkbox"/> Political

Relationship to Program Outcomes:

Check all that apply:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a recognition of the need for and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice