Thermodynamics

Catalog: Equations of state, ideal gases, first and second laws of thermodynamics, entropy and statistical methods.

Hours: 3 hours (3 lecture/0 Lab)

Prerequisites: PHYS 2426 University Physics II;
Calculus III (co-requisite)

Campus Numberings:

Midwestern State University	PHYS 3333	Texas A&M University-Corpus Christi	PHYS 3490
Prairie View A&M University	PHYS 4063	Texas A&M University-Kingsville	PHYS 3333
Tarleton State University	PHYS 333	Texas Southern University	PHYS 336
Texas A&M University-Commerce	PHYS 414	West Texas A&M University	PHYS 3320

Course Learning Objectives:
The students in this course will be able to:

- Apply the underlying principles of physics learned in PHYS 2425/2426 to thermal physics,
- Apply the new concepts of thermal physics to solve quantitative and qualitative problems in thermodynamics and statistical mechanics.

Learning Outcome	Method Used for Assessment
• Use appropriate mathematical techniques in solving advanced physics problems.	Course embedded assessment
• Display critical thinking skills in applying their knowledge to realistic problems and situations.	Course embedded assessment
• Demonstrate adequate core knowledge in physics topics: mechanics, thermodynamics, electromagnetism, modern physics, and mathematical methods.	Embedded assessment within final exam

Detailed Learning Objectives:

Each student should have an understanding of and be able to work problems at the junior/senior level involving:

- The basic problem and postulates of thermodynamics and statistical mechanics
- The conditions of equilibrium
- Simple models of thermodynamic systems (especially the Ideal Gas and Einstein Solids)
- Use statistical physics, expressly the statistical description of entropy, to describe the second law of thermodynamics especially for the ideal gas and Einstein solid.
- Formal thermodynamic relationships
- Reversible processes and the maximum work theorem
- Alternative formulations and Legendre transformations
- The extreme principle in the Legendre Transformed representation
- Maxwell relations
- Statistical mechanics in the entropy representation: the Microcanonical formalism
- The Canonical Formalism: Statistical mechanics in Helmholtz Representation

Each student is also expected to be able to effectively communicate mathematical and scientific information in written form including, but not limited to, using email to submit written chapter summaries and writing a review paper over a topic of interest. Submitted work has to be in a readable professional form.