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Course Description:
This course is intended to be a first year graduate course in thermodynamics. One characteristic of the course is a greater depth of study of undergraduate subject matter, with a focus on advancing to more complex analyses and topics. The course moves much faster than an undergraduate course, focusing on concepts and application areas that are typically more difficult for undergraduates. We begin with 1st and 2nd Law analyses of processes, devices, and systems advancing to equations of state, property relations, gas mixtures, chemically reacting systems, and equilibrium.

Course Objective:
- Develop a complete understanding of the concepts underlying the First and Second Laws
- Couple time and rate mechanisms into thermodynamic analyses
- Develop ability to deal with non-ideal gas behaviors and multi-component gas mixtures in solving problems, including equilibrium
- Understand the basis for thermodynamic property relations and equations of state
- Improve skills in using computational tools to help solve practical, yet complex problems

Course Prerequisite(s): MEGN 351, 361, and 471 or consent of instructor. MEGN 461 is recommended.


Other Reading:

Topics Covered:
- Fundamental concepts (Properties, systems, energy)
- Energy and the First Law (more comprehensive application study)
- Second Law – Classical Approach (Reversible and irreversible processes, entropy balances)
- Finite Time Considerations of the 2nd Law
- Exergy Analysis (Theory of the potential to do useful work and Application analysis)
- Equations of state and Departure relations
- Property Relations for Pure Fluids and Phase Equilibrium
- P-v-T Relations for Ideal Gas and Non-ideal gas mixtures
- Psychrometrics
- Combustion and Reacting Systems
- Chemical exergy
- Chemical Equilibrium
- Introduction to Statistical Thermodynamics (time allowing)