

Exam Topic Area: Thermodynamics (prepared in 2017F)

Questions on the exam are designed to test a thorough understanding of the fundamentals and applications of thermodynamics whose specifics are listed below. Question difficulty will generally be at the level of challenging undergraduate material, and often require understanding and application of multiple concepts to come to the correct solution.

Questions will test the student's ability to derive and apply fundamental principles of thermodynamics. Students will be allowed to bring a one page (front and back) equation sheet which must be submitted with the exam. On the equation sheet can be equations, notes about the equations, etc. but worked-out solutions to problems will not be allowed. Non-programmable calculators will be provided but may not be needed. Any necessary tables or figures will be provided with the exam.

Reference List:

- Cengel and Boles, "Thermodynamics: An Engineering Approach," 8th Edition, McGraw-Hill.
- Moran, Shapiro, Boettner, and Bailey, "Fundamentals of Engineering Thermodynamics," 7th Edition, Wiley.

List of question topic for Thermodynamics:

- Classical equilibrium thermodynamics
- The system, system boundary, interactions (heat, work, material flow)
- The laws of thermodynamics (zero to the third laws) and their application to systems
- States and process (adiabatic, isentropic, isobaric, steady state, etc.)
- Properties and property relationships (incl. Maxwell relations)
- Cycles, work, efficiency
- Exergy analysis
- Gas power cycles and air-standard analysis
- Vapor power and refrigeration cycles
- Mixtures and psychrometrics
- Chemical equilibrium (Equilibrium chemical reactions, equilibrium constants, specific reaction rate constant, species formation, adiabatic flame temperature, and heat of combustion)

Undergraduate courses offered in this area:

Courses listed here are for your reference only and may be helpful for relearning/reviewing the material. Questions on the exam are limited by the topics list and reference list, not by the material covered in this (these) course(s):

- ME 220 – Thermodynamics I
- ME 321 – Thermodynamics II