Sungkyunkwan University (SKKU) International Summer Semester (ISS) 2026

Thermodynamics

Prof. Chang-Hwan Choi, Stevens Institute of Technology

SHORT COURSE DESCRIPTION

This course introduces students to concepts of energy, heat and work; thermodynamic properties of substances and property relationships, phase change; First and Second Laws for closed and open systems including steady and transient processes and cycles; using entropy; representative applications including vapor and gas power and refrigeration cycles.

READING MATERIALS

- Class materials including lecture slides, example problems, and supporting material will be shared with students for viewing before and after lectures.
- Recommended textbook: Fundamentals of Engineering Thermodynamics, 9th edition, Wiley, 2018, by M.J. Moran, H.N. Shapiro, D.D. Boettner, and M.B. Bailey.

COURSE REQUIREMENTS AND GRADING

- Prerequisites: Calculus, Chemistry, Physics
- Attendance is mandatory. If one is absent more than three times, one will fail the course.
- Grading: Quizzes 70%, Final exam 30%.
- Grade of 60 or above is Pass.

COURSE SCHEDULE

– WEEK I –

Monday (29 June) Introductory Concepts and Definitions

Tuesday (30 June) Quiz 1; Energy & the First Law of Thermodynamics: Energy Transfer by Work and Heat

Wednesday (1 July) Quiz 2; Energy & the First Law of Thermodynamics: Energy Balance for Closed Systems

Thursday (2 July) Quiz 3; Energy & the First Law of Thermodynamics: Energy Analysis of Cycles

– WEEK II –

Monday (6 July) Quiz 4; Evaluating Properties: p-v-T Relation, Phase Change, Specific Internal Energy and Enthalpy, Property Tables, Specific Heats

Tuesday (7 July) Quiz 5; Evaluating Properties: Evaluating Properties of Liquids and Solids

Wednesday (8 July) Quiz 6; Evaluating Properties: Evaluating Properties of Ideal Gas, Polytropic Process Relations

Thursday (9 July) Quiz 7; Control Volume Analysis Using Energy: Mass Rate Balance and Conservation

of Energy for a Control Volume

– WEEK III –

Monday (13 July) Quiz 8; Control Volume Analysis Using Energy: Analyzing Control Volumes at Steady State including Nozzles, Diffusers, Turbines, Compressors, Pumps, Heat Exchangers, Throttling Devices

Tuesday (14 July) Quiz 9; Control Volume Analysis Using Energy: Transient Analysis

Wednesday (15 July) Quiz 10; The Second Law of Thermodynamics: Irreversible and Reversible Processes, Applying the Second Law to Thermodynamic Cycles, Carnot Cycle, Clausius Inequality

Thursday (16 July) Quiz 11; Using Entropy: Entropy Change of an Incompressible Substance and Ideal Gas

– WEEK IV–

Monday (20 July) Quiz 12; Using Entropy: Entropy Balance for Closed Systems

Tuesday (21 July) Quiz 13; Using Entropy: Entropy Rate Balance for Control Volumes, Isentropic Processes

Wednesday (22 July) Final Exam