University of Arkansas
Mechanical Engineering Department
MEEG 5403 - Advanced Thermodynamics
Distance Ed Syllabus

Instructor: Rick J. Couvillion, ME 208, 479-575-4155, rjc@uark.edu, website

Text: None currently. Use instructor notes that can be downloaded via the 'Schedule and Lecture Notes' link on Blackboard.

Previous Text: *Introduction to Thermodynamics - Classical and Statistical*, by Sonntag and Van Wylen, 3rd ed. Out of print.

References: *Thermodynamics*, by J. P. Holman, 1st ed; *Heat and Thermodynamics*, by Zemansky and Dittman; *Introduction to Physical Gas Dynamics*, by Vincenti and Kruger.

Software - Excel and Visual Basic will be useful on some assignments. Install Excel's 'Solver' add-in. A spreadsheet with functions to calculate thermodynamic properties is available in the 'Downloads' folders on Blackboard.

Objectives: (1) Develop a comprehensive understanding of the basic principles and applications of classical thermodynamics and (2) provide an introduction to the concepts of microscopic thermodynamics, including classical quantum mechanics, elementary kinetic theory, molecular models, and statistical thermodynamics.

Prerequisite: Thermodynamics I, Excel, and Matlab skills.

Lectures - Recorded lectures are accessed in the 'Recorded Lectures' link on Blackboard. On average, 5 recorded lectures per week will be covered in an 8-week session. There are lecture notes that each cover roughly 2-3 recorded lectures. These notes can be downloaded via the 'Lecture Notes and Schedule' link on Blackboard. Course content and schedule shown below.

Drills - There will typically be one online drill each week using Blackboard Collaborate. Instructions for signing on to a Collaborate drill session are available in the 'Downloads' folder on Blackboard. Drills will focus on questions about the lectures and the homework.

Communications - UA emails for all class members will be provided to encourage collaboration. If the class finds discussion groups useful, they will be set up on Blackboard.

Grade Basis - Three Exams - 80%, Programs/Homework - 20%

Homework - Homework assignments 01 - 02 must be submitted before Exam 01 will be given. Assignments 03 - 04 must be submitted before Exam 02. Homework 05 - 06 must be submitted before Exam 03. Homework done by hand should be scanned and submitted as a single pdf file. One or more programs may require computer programming using Excel, Basic, Matlab, FORTRAN, or C.

Academic Honesty - Academic honesty is expected, and dishonesty as described in the UA academic integrity policy will be penalized. Penalties will range from getting zero on a homework, quiz, project, or exam to failure of the course and/or report to the College of Engineering Academic Integrity Monitor. However, these penalties will pale in comparison to the instructor knowing that you are a person who cannot be trusted. If a potential employer asks, the instructor will be obligated to express his concerns about your integrity.

MEEG 5403 - Advanced Thermodynamics
Schedule and Lectures - Distance Ed

Week	Lecture Notes	Lecture Recordings	Topic
1	Review	01 - 05	Thermo I Review
			Thermo I Review
2		06 - 08	Thermo I Review
			Exam 01 on Thermo Review Notes
	Lecture 01	09 - 11	Thermo Relations, Clapeyron Equation
	Lecture 02		Enthalpy, Internal Energy, and Entropy Changes
3	Lecture 03	11 - 16	Equations of State, Generalized Charts
	Lecture 04		Development of Property Tables
	Lecture 05		C_p, C_v Variation, Other Properties
	Lecture 06		Fuels, Combustion, Enthalpy of Formation
4	Lecture 07	17 - 22	First Law Analysis, Adiabatic Flame Temperature
	Lecture 08		Entropy Change
	Lecture 09		Chemical Equilibrium, Equilibrium Composition
			Exam 02 - Lecture Notes 01-09
5	Lecture 10	23 - 25	Kinetic Theory
6	Lecture 11	26 - 30	Maxwell's Distribution
	Lecture 12		Transport Properties
7	Lecture 13	31 - 35	Statistics of Independent Particles
	Lecture 14		Quantum Mechanics, Equilibrium State, First Law
8	Lecture 15	36 - 37	Entropy, Second Law
			Exam 03 - Lecture Notes 10-15