SYLLABUS

Course Structure: Lecture MWF, Duration 2:15

Instructor: Alex Tsai, email: alex.tsai@yale.edu

Course Description:

Fundamental principles of classical equilibrium thermodynamics. Modeling of gas and fluid properties and thermodynamic processes. Development and application of the first and second laws of thermodynamics to steady flow, transient flow and non-flow processes. Applications of the conservation of energy and thermodynamics to power and refrigeration cycles. The course concludes with a psychrometric analysis.

Course Objectives:

- Understand the application of the 1st and 2nd Laws of Thermodynamics and the conservation of mass to engineering processes
- Understand ideal gas law properties and application of control volumes
- Understand the implementation of gas and steam flows in power cycles
- Study the properties of phase changes of pure substances
- Apply thermodynamic laws to heat engines/ heat pumps / refrigerators
- Apply thermodynamic laws in Psychrometrics

Text:

Fundamentals of Thermodynamics 10th Ed., Claus Borgnakke, Richard Sonntag, Wiley 2019

Grading: Homework (20%), Exams 2x (50%), Final (30%)

Schedule:

Date				Topic	Exams	Hw
Week 1	1	M	7-Jun	Engineering Applications / Ideal Gas Law / Properties		TBD
	2	W	9-Jun	Work and Heat / Gas Applications		
	3	F	11-Jun	Conservation Law / Control Volumes / RTT		
Week 2	4	M	14-Jun	1st Law of Thermodynamics / Gas Applications		
	5	W	16-Jun	2nd Law of Thermodynamics / Gas Applications	Exam 1	
	6	F	18-Jun	Irreversibility / Availability		
Week 3	7	M	21-Jun	Power Systems I: Rankine Cycle		
	8	W	23-Jun	Power Systems II: Refrigeration Cycle		
	9	F	25-Jun	Power Systems III: Brayton Cycle		
Week 4	10	M	28-Jun	Power Systems IV: Otto / Diesel Cycles		
	11	W	30-Jun	Steam Plants / Heat Engine / Heat Pump	Exam 2	
	12	F	1-Jul	Combustion I		
Week 5	13	M	5-Jul	Combustion II		
	14	W	7-Jul	Psychrometrics		
	15	F	9-Jul	Final Exam		