MEC 301: Thermodynamics
The State University of New York Korea – Stony Brook University
Fall 2020

INSTRUCTOR	Dr. Jongseong Choi	jongseong.choi@sunykorea.ac.kr	Academic Building B625
CLASSES	TUTH	3:30 – 4:50 pm	Academic Building B204
OFFICE HOURS	Wednesday	2:00 – 4:00 pm, or by appointment	Academic Building B625

COURSE TEXTBOOK
Thermodynamics: An Engineering Approach, Çengel Y., Boles M. A., McGraw-Hill Education, 8 ed., 2015.

PREREQUISITE
AMS 261/MAT 203; PHY 131 or 125 or 141; CHE 131; MEC Major

ASSIGNMENTS
As basic preparation for each lecture, you should read the assigned material before coming to class. In-class discussion and examples are designed to help prepare you for homework assignments. In addition to the reading and homework assignments, you should review your past class notes on a daily basis.
Homework: Individual homework is assigned weekly throughout the semester. They will be given every Tuesday. Homework assignment should be scanned and submitted through Blackboard (https://blackboard.stonybrook.edu/) before Tuesday at 11:59 pm of the following week. The homework assignments and solutions will be posted on the Blackboard.

EXAMINATION
There are two midterm examinations and one comprehensive final examination. All examinations are open book but closed notes. A list of equations is provided for the exams. You can bring your TI-30X calculator, pencil(s), and eraser. The use of smartphones, laptop, iPad, or any other sources of communication is strictly prohibited. For the grading, point deduction will occur when you do not represent: the engineering approach, energy flow diagram (EFD), list of assumptions and equations, and sufficient details of the solution. Problem solution format will be provided in detail on the following page.

COURSE GRADING

Homework	20%
Midterm #1	20%
Midterm #2	20%
Final Exam	40%
TOTAL	100%

Grading will be curved and normalized to 100% then given in a straight-scale ($90 \leq$ any A < 100; $80 \leq$ any B < 90, etc).

HYBRID COURSE SCHEDULE
On behalf of University policy, we will implement a hybrid course schedule for the Fall 2020 semester, which is a combination of in-person and online learning. Therefore, the classes are organized as in-person sessions in one week and online sessions in the other week. *Even Weeks in person* is designated for this course. Please find details in the following pages of '**Course Schedule**'. The link for the online classroom will be provided on the Blackboard.

SAFETY GUIDELINE
During the in-person classes, each student will have a designated seat in the classroom so that the ***social distancing must be kept***. Everyone will check the temperature before entering buildings, disinfect hands in front of the classrooms and wear masks while on campus. Please refer to the 'Guidelines for Fall 2020 in COVID-19 Situation' for more information.'

COURSE LEARNING OBJECTIVES	ASSESSMENT TOOL
1. Determine the thermodynamic properties of a material, given two independent thermodynamic properties and the use of the state postulate	Exams/ Homework
2. Demonstrate the concepts of work, heat, and internal energy in the analysis of thermodynamic systems	Exams/ Homework
3. Demonstrate the First Law (Conservation of Energy) for closed systems	Exams/ Homework
4. Demonstrate the First Law (Conservation of Energy) for open systems	Exams/ Homework
5. Be able to determine the thermodynamic efficiency of a power system, or the coefficient of performance of a refrigeration system	Exams/ Homework
6. Apply the Second Law of thermodynamics in the analysis of thermodynamic systems	Exams/ Homework

COURSE OVERVIEW

Variables that describe the thermodynamic state of a system or control volume, including absolute temperature, internal energy, enthalpy, and entropy are introduced, and basic principles governing the transformations of energy, especially heat and work, are developed. Underlying principles are used to analyze and solve problems related to thermodynamic systems and to determine the changes in properties of the systems and surroundings implied by changes in inputs, configuration, or constraints.

COURSE TOPIC
1. Properties, processes and cycles
2. Energy conservation and the first law
3. Analysis of closed systems
4. Analysis of open systems
5. Entropy
6. The Second Law of Thermodynamics
7. Introduction to thermodynamic cycles

PROBLEM SOLUTION FORMAT

For both homework and examination, use empty A4-size paper, only one side and only one problem per page. If more than one page is needed for a problem, all pages must be transmitted in order. At the top of the paper, you write the following information from left:

Your name (first, last)	Student ID number	Problem number (i.e. HW1, HW2, …)	Page number (i.e. 1/3, 2/3, 3/3, …)

Then, provide the information listed below:

Find: List what the problem wants you to find. You use this information to decide on the system you'll be analyzing, and how you'll sketch the appropriate energy flow diagram. This information will also drive your choice of basic equation(s) for problem solution since the one(s) you chose must include the quantity (or quantities) of interest.

Energy Flow Diagram (EFD): Your Energy Flow Diagram (EFD) will identify your system boundary, indicate where energy and mass flow into/out of your system, and which forms these flows take. Your EFD will guide your choice of terms in the basic equations that you keep or reject.

Given: Given information serves three purposes. First, it helps you determine which terms in your basic equations you can settle on immediately. Second, it helps you determine how many basic equations you need—the number of basic equations must equal the number of unknowns. Third, it provides guidance for constructing your EFD.

Assumptions: Assumptions are listed to help you eliminate terms in your basic equations. e.g. "Steady state," "Uniform flow," "Ideal gas," etc.

Solution: This includes correct units.

BLACKBOARD
All homework assignments and solutions will be posted on the Blackboard course account (http://blackboard.stonybrook.edu/). For problems logging in, go to the coordinator of the department. It is your responsibility to make sure that you can access the blackboard system.

ACADEMIC HONESTY
The campus policies on academic honesty are available on the Web (http://naples.cc.sunysb.edu/CAS/ajc.nsf/pages/info). Academic dishonesty is an extremely serious offense and will not be tolerated in any form. Academic dishonesty in general is the presentation of intellectual work that is not originally yours. Examples include, *but are not limited to*, copying or plagiarizing class assignments including homework, reports, and other submitted materials; copying or otherwise communicating answers on exams with other students; bringing unapproved aids, either in physical (written) or electronic form to an exam; obtaining copies of an exam prior to its administration, etc. Academic dishonesty violates both the ethical and moral standards of the Engineering profession and all infractions related to academic dishonesty will be prosecuted. Faculty members are required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website: http://www.stonybrook.edu/commcms/academic_integrity/index.html

SPECIAL NOTE ON ADA
If you have a physical, psychological, medical or learning disability that may impact your course work, please contact One-Stop Service Center, Academic Building A201, (82) 32-626-1117. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

CRITICAL INCIDENT MANAGEMENT STATEMENT
The State University of New York, Korea expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

ATTENDANCE POLICY of SUNY KOREA
1. All students of SUNY Korea are required to attend every class.
2. Unexcused absences will affect seriously the student's final grade in the course.
3. If a student has over 20% unexcused absence, the student's final course grade will be an 'F'.
4. Students should report the reason of absence to the instructor in advance, or immediately after the absence.
5. When a student excuses his/her absence, the student must provide documentation of the reason for the absence to the instructor.
6. The instructor of the course reserves the right to excuse absences.
7. The course instructor may excuse the absence if the submitted documentation fulfills the conditions below. • Extreme emergencies (e.g. death in the family) • Severe medical reasons with doctor's note (Not a slight illness) • Very important events (e.g. national conference, official school event)
8. At the end of semester, the course instructor should submit a copy of the attendance sheet to the Academic Affairs Office.

Course Schedule
MEC 301: Thermodynamics
The State University of New York Korea – Stony Brook University
Fall 2020

Lecture	Day	Date	Location	Topic	Chap.	HW given	HW due
1	TU	Aug 25	online	Syllabus; Basic concept; Units; Control volume; Specific gravity; Equilibrium	Ch.1	HW #1	
2	TH	Aug 27	online	Process & cycle; **0th law**; Pressure; Meas.; Eng. approach to prob. solving tech.	Ch.1		
3	TU	Sep 1	B204	Energy; Heat; Work	Ch.2	HW #2	HW #1
4	TH	Sep 3	B204	Total energy and transfer; **1st law**	Ch.2		
5	TU	Sep 8	online	Energy conversion; Efficiency; Energy analysis of cycles	Ch.2	HW #3	HW #2
6	TH	Sep 10	online	Evaluating properties; Phase-change; Property diagram	Ch.3		
7	TU	Sep 15	B204	Property tables	Ch.3	HW #4	HW #3
8	TH	Sep 17	B204	Property tables; Practice	Ch.3		
9	TU	Sep 22	online	Ideal gas model; ideal gas properties; Review of Ch. 1 – 3	Ch.3	HW #5	HW #4
10	TH	Sep 24	online	Boundary condition; Polytropic process	Ch.4		
	TU	Sep 29	B204	Midterm #1 – No class			
	TH	Oct 1		Chuseok holiday - No class			
11	TU	Oct 6	online	Energy balance; Specific heats	Ch.4	HW #6	HW #5
12	TH	Oct 8	online	Internal energy and enthalpy	Ch.4		
13	TU	Oct 13	B204	Conservation of mass; 1st law w/o mass flow	Ch.5	HW #7	HW #6
14	TH	Oct 15	B204	Energy of a flowing fluid; 1st law w/t mass	Ch.5		
15	TU	Oct 20	online	Steady-flow systems	Ch.5	HW #8	HW #7
16	TH	Oct 22	online	Unsteady-flow systems; 1st law practice	Ch.5		
17	TU	Oct 27	B204	1st law practice	Ch.5	HW #9	HW #8
18	TH	Oct 29	B204	More 1st law practice; System integration; Review of Ch. 4 – 5	Ch.5		
19	TU	Nov 3	online	**2nd law**; Irreversibility; Thermodynamic cycles and 2nd law	Ch.6	HW #10	HW #9
20	TH	Nov 5	online	T-ds relations; Carnot cycle; Heat engine	Ch.6		
	TU	Nov 10	B204	Midterm #2 – No class		HW #11	HW #10
21	TH	Nov 12	B204	Heat pump and refrigerator	Ch.6		
22	TU	Nov 17	online	Heat pump and refrigerator	Ch.6	HW #12	HW #11
23	TH	Nov 19	online	Entropy change for ideal gases; 2nd law w/o mass flow; 2nd law w/t mass flow	Ch.7		
24	TU	Nov 24	B204	2nd law practice	Ch.7	HW #13	HW #12
25	TH	Nov 26	B204	Isentropic process	Ch.7		
26	TU	Dec 1	online	Entropy of liquids, solids, and ideal gases; Compressor; Entropy balance	Ch.7	HW #14	HW #13
27	TH	Dec 3	online	Course Review			
		TBD	TBD	Final Examination			HW #14