ME 400 Engineering Thermodynamics II Fall 2014

Instructor: James Mathias (Associate Professor) **Office:** EGRE-024 **Phone:** 618-453-7016 **Email:** mathias@engr.siu.edu Office Hours: M,W,F 1-3PM

Teaching Assistant and Homework Grader: Patrick Selzer **Office:** EGRB-122 Phone: 815-600-0894 Email: pselzer@siu.edu Office Hours: 12-2 pm on Thursdays

Class Time: 10:00-10:50 AM, M,W,F Classroom: EGRA-322

Course Text: Moran, M.J. and Shapiro, H.N., Fundamentals of Engineering Thermodynamics, 6th or 7th edition, John Wiley and Sons, 2008, or 2011.

Course Objective: The objective is to provide you (the students) with: (1) a qualitative and quantitative understanding of exergy, exergy destruction, and exergetic efficiency, (2) an in-depth analysis of the power cycles necessary for the design of transportation engines and stationary power plants, (3) methods to analyze the performance and operating conditions of vapor compression refrigeration cycles, and (4) methods to analyze combustion processes typically used in power cycles.

Philosophy: (1) Someone (you, your parents, or other individuals) has paid for you to learn advanced thermodynamics; you should demand a lot from this money that has been paid. I will try my best to teach you the material so that you are encouraged to learn the material.

(2) Your degree has great value when the degree represents that you have successfully learned the material prescribed by the department. In the long run if you have not learned the material it will result in a disadvantage to you and the companies that employ you eventually resulting in the company's and/or your downfall.

(3) The department chairman, dean, and chancellor of the university have indirectly asked me to recommend those students who know this material sufficiently well to receive passing grades. I take this responsibility very seriously. Therefore to receive a passing grade in this course you will need to receive greater than an average of 63% on the tests given and on the final exam.

Topics and Chapters Covered:

- Exergy, exergetic efficiency, and exergy destruction (5 lectures) •
- Advanced vapor power cycles (10 lectures) •
- Gas power cycles (12 lectures) •
- Ideal vapor compression cooling cycle, absorption cooling cycle, heat pump systems (10 lectures) •
- Combustion and review for final exam (6 lectures) •
- These topics are covered in Chapters 7-10, and 13 in the textbook. •

Homework: Homework is due most Fridays of the semester. The homework assignment will at least be distributed the Monday before it is due. Homework is due when class begins but is not late until 4:00PM on the Friday it is due at my office. Assignments turned in up to one class period late receive a 20% deduction in score; homework turned in more than one class period late receives no credit. Units must be used throughout the problem and cancelled correctly; if not you will at least receive a one-point

deduction even if you obtained the correct answer. The lowest homework assignment will be dropped. Please follow guidelines in Section 1.7.3 "Methodology for Solving Thermodynamic Problems" when solving homework problems.

Solving homework problems in groups of 2-3 is acceptable and encouraged if all students: (1) participate in the solving of all the homework problems, (2) understand the problems and how they were solved, and (3) wrote the homework themselves. Copying homework electronically or by hand is unethical, against university policy, and results in lower exam scores because those individuals do not understand the homework problems and material of the course. <u>The students who, eventually, can</u> solve homework problems individually are able to solve these problems during tests.

Lab and Field Trip: The course includes a field trip to a power plant and automotive engine facility.

<u>**Class Participation:**</u> When you signed up for the class it is implied that you agreed to participate in class often. Participation is considered (1) attending class; (2) paying attention; (3) asking questions when you have them; (4) answering questions when you are asked. After three times of not participating you receive a 1% deduction until all 3% is gone. If there are more than 20 times with no class participation you should petition the university to withdraw for the semester because a serious issue must have arisen that does not allow you to fulfill your class participation commitment. Another advantage is there should be great advantage and additional learning that is gained during class time; if this is not the case please let me know.

Exams: There will be 3 exams given during the semester and the final comprehensive exam at the end of the semester. **One question of each of the 3 exams during the semester will be exactly from the homework.** Exams will be given after Chapters 7-8, 9, and 10; the exams will be given in class and will consist of approximately 3 problems to be completed in 50 minutes. The final exam will cover the material for the entire semester and will include problems from Chapter 13 which will not be tested during the semester.

There will be assigned seating during the exams and the exams must be completed with a calculator acceptable for use in the Fundamentals of Engineering (FE) exam. These calculators are all Casio fx-115 models, HP 33s and HP 35s, and all TI-30X and TI-36X models. In each exam you can bring one side of a one-half sheet of 8.5 by 11 inch paper that only has equations on it and what the variables mean in the equation and the final you are allowed to use four half sheets of paper with equations on it. The exams are closed book but you can use the thermodynamic tables at the back of your book.

Please give me as much advance notice as possible if there is a conflict with the exam. If there is an emergency that conflicts with the scheduled exam, a make-up exam will be given, I try to give a fair make-up exam however it is very difficult to write another exam that is the same difficulty as the first exam therefore, please make all efforts to attend the original exam.

Grading Policy:	
Homework	13%
Exams during semester	54%
Final Exam	30%
Class participation	3%
	100%

<u>Major changes this semester</u>: Introduce EES earlier which can be used for one problem each homework assignment, no quizzes, shorter tests, homework problems will include figures but less text.

Tentative Schedule for ME400, Fall 2014				
Date	Day	Lecture #	<u>Material</u>	HW Due
18-Aug-13	Μ	1	7.1-7.2	
20-Aug-13	W	2	7.3 & Problem 7.24	
22-Aug-13	F	3	7.4-7.5 & Problem 7.55	HW #1
25-Aug-13	Μ	4	7.6	
27-Aug-13	W	5	More Exergy	
29-Aug-13	F	6	8.1-8.2.3	HW #2
1-Sep-13	Μ	Holiday	Holiday	
3-Sep-13	W	7	8.3	
5-Sep-13	F	8	8.4.1	HW #3
8-Sep-13	М	36	Present EES and Solve Problem	
10-Sep-13	W	9	8.4.2	
12-Sep-13	F	10	8.5 (Binary Vapor Cycle) and closed feed water heater example problem	HW #4
15-Sep-13	Μ	11	8.5 (Cogeneration)	
17-Sep-13	W	12	Cogeneration example problem and catch-up	
19-Sep-13	F	13	Field trip to Prarie State Powerplant	HW #5
22-Sep-13	М	14	Review for Test 1	
24-Sep-13	W	15	Test 1	
26-Sep-13	F	16	9.1 - 9.2 (Otto Cycle)	Thank you letter for power plant tour
29-Sep-13	М	17	9.3 (Diesel Cycle) & Prob. 9.21	• • •
1-Oct-13	W	18	9.5-9.6	
3-Oct-13	F	19	9.7	HW #6
6-Oct-13	М	20	Problem 9.49	
8-Oct-13	W	21	9.8.1-9.8.3	
10-Oct-13	F	22	Problem 9.75	HW #7
13-Oct-13	М	Holiday	Holiday	
15-Oct-13	W	23	9.9	
17-Oct-13	F	24	More Ch 9 things	HW #8
20-Oct-13	Μ	25	Tour of aviation and automotive technology	
22-Oct-13	W	26	Review for Test 2	
24-Oct-13	F	27	Test 2	
27-Oct-13	Μ	28	10.1-10.3	
29-Oct-13	W	29	Problem 10.6 and review Test 2	
31-Oct-13	F	30	10.4.1-10.4.2	HW #9
3-Nov-13	Μ	31	Problem 10.28 and Section 10.5	
5-Nov-13	W	32	10.5 - 10.6	
7-Nov-13	F	33	Heat pump problem and 10.7	HW #10
10-Nov-13	Μ	34	10.7 and example problem from 10.7	
12-Nov-13	W	35	More Ch 10 or sample problem	
14-Nov-13	F	37	Review for Test	HW #11
17-Nov-13	Μ	38	Test 3	
19-Nov-13	W	39	13.1-13.2.1 Introducing combustion	
21-Nov-13	F	40	13.2.2 Control volumes at steady state	
24-Nov-13	Μ	41	13.2.2-13.2.3 Closed systems with combustion	HW #12
26-Nov-13	W		Holiday	
28-Nov-13	F		Holiday	
1-Dec-13	Μ	42	13.3 Adiabatic flame temperature	
3-Dec-13	W	43	Fuel cells	
5-Dec-13	F	44	Review for final	HW #13
10-Dec-14	W		Final Exam 10AM - 11:45AM	

SIU Southern Illinois University

Syllabus Attachment

Fall 2014

"We emphasize student achievement and success because achievement and

success are essential if we are to shape future leaders and transform lives." 1

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http://pvcaa.siu.edu/

IMPORTANT DATES *

08/24/2014
08/31/2014
10/26/2014
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10/31/2014
2/8-12/12/2014

Note: For outreach, internet, and short course drop/add dates, visit

Registrar's Academic webpage http://registrar.sin.edu/ FALL SEMESTER HOLIDAYS

Labor Day 09/01/2014

Fall Break 10/11--10/14/2014 Veterans Day 11/11/2014 Thanksgiving Vacation 11/26--11/30/2014

WITHDRAWAL POLICY ~ Undergraduate only

Students who officially register for a session may not withdraw merely by the stopping of attendance. An official withdrawal form needs to be initiated by the student and processed by the University. For the proper procedures to follow when dropping courses and when withdrawing from the University, please visit http://registrar.siu.edu/odf/ugradcatalog1314.pdf

INCOMPLETE POLICY~ Undergraduate only

An INC is assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments. An INC must be changed to a completed grade within one semester following the term in which the course was taken, or graduation, whichever occurs first. Should the student fail to complete the course within the time period designated, that is, by no later than the end of the semester following the term in which the course was taken, or graduation, whichever occurs first, the incomplete will be converted to a grade of F and the grade will be computed in the student's grade point average. For more information please visit:

http://registrar.siu.edu/grades/incomplete.html

REPEAT POLICY

An undergraduate student may, for the purpose of raising a grade, enroll in a course for credit no more than two times (two total enrollments) unless otherwise noted in the course description. For students receiving a letter grade of A,B,C,D, or F, the course repetition must occur at Southern Illinois University Carbondale. Only the most recent (last) grade will be calculated in the overall GPA and count toward hours earned. See full policy at

http://registrar.siu.edu/pdf/ugradcatalog1314.pdf

GRADUATE POLICIES

Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please visit

http://gradschool.siu.edu/about-us/grad-catalog/index.html

DISABILITY POLICY

Disability Support Services provides the required academic and programmatic support services to students with permanent and temporary disabilities. DSS provides centralized coordination and referral services. To utilize DSS services, students must come to the DSS to open cases. The process involves interviews, reviews of student-supplied documentation, and completion of Disability Accommodation Agreements.

http://disabilityservices.siu.edu/

¹ Southern Elinois University Carbondale. (2013). Pothways to Euselence: A Strategic Plan. Retrieved from <u>http://charcelia.oku/common/docu/A_Strategic_Plan.odf</u>

PLAGIARISM CODE

http://press.siu.edu/_common/documents/Plagintion/Outlide%20to%20Preventing%20Plagintion.pdf SALUKI CARES

The purpose of Saluki Cares is to develop, facilitate and coordinate a university-wide program of care and support for students in any type of distress—physical, emotional, financial, or personal. By working closely with faculty, staff, students and their families, SIU will continue to display a culture of care and demonstrate to our students and their families that they are an important part of the community. For Information on Saluki Cares: (618) 453-5714, or siucares@siu.edu,

http://salukicares.siu.edu/index.htm

EMERGENCY PROCEDURES

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. We ask that you become familiar with the SIU Emergency Response Plan and Building Emergency Response Team (BERT) programs. Emergency response information is available on posters in buildings on campus, available on BERT's website at www.bert.siu.edu, Department of Safety's website at www.dps.siu.edu (disaster drop down) and the Emergency Response Guideline pamphlet. Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency.

INCLUSIVE EXCELLENCE

SIU contains people from all walks of life, from many different cultures and sub-cultures, and representing all strata of society, nationalities, ethnicities, lifestyles, and affiliations. Learning from and working with people who differ is an important part of education as well an essential preparation for any career. *For more information please visit:* http://www.inclusiveexcellence.siu.edu/

MORRIS LIBRARY HOURS

http://www.lib.siu.edu/about

LEARNING AND SUPPORT SERVICES

Help is within reach. Learning support services offers free tutoring on campus and math labs. To find more information please visit the Center for Learning and Support Services website:

Tutoring : http://tutoring.siu.edu/

Math Labs http://tutoring.siu.edu/math_tutoring/index.html WRITING CENTER

The Writing Center offers free tutoring services to all SIU students and faculty. To find a Center or Schedule an appointment please visit http://write.siu.edu/

AFFIRMATIVE ACTION & EQUAL OPPORTUNITY

Our office's main focus is to ensure that the university complies with federal and state equity policies and handles reporting and investigating of discrimination cases. *For more information visit*:

http://diversity.siu.edu/#

Additional Resources Available:

SALUKINET: http://salukinet.siu.edu/cp/home/displaylogin ADVISEMENT: http://advisement.siu.edu/

Fall 2014 R.O'Rourke