SYLLABUS
MENG 2203-301: Thermodynamics
(Required Course)
Summer I - 2020

Instructor: Dr. Salim Azzouz

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Office Hours:Set an appointment online with instructor.

Course Schedule: MTWR 2:30 PM - 4:20 PM, Location: Online through Zoom.

CATALOG DESCRIPTION
The fundamental laws of thermodynamics; properties of systems, solids, liquids, and gases; and thermodynamics tables.

COURSE PREREQUISITES
MATH 2534 Calculus III

OTHER PREREQUISITES
Basic computer skills, MS Excel, hand calculator

TEXTBOOK
Fundamentals of Engineering THERMODYNAMICS, 9th. Edition, Michael J. Moran, Howard N. Shapiro, Daisie D. Boettner, Margaret B. Bailey.

REFERENCES
Additional material will be distributed online through D2L.

TOPICS COVERED

Topics	Topics
Defining volume, pressure, and temperature	Vapor Power Systems
Energy and the First Law of Thermodynamics	Gas Power Systems
Evaluating Properties	Refrigeration and Heat Pump Systems
Control Volume, Analysis Using Energy	Thermodynamics Relations
The Second Law of Thermodynamics	Psychrometric Applications
Using Entropy	Combustion*
Exergy Analysis	Vapor Power Systems*

* if time permits.

COURSE LEARNING OBJECTIVES AND RELATIONSHIP TO STUDENT OUTCOMES

Outcome-Related Course Learning	1	2	3	4	5	6	7
Name the three major mechanisms of heat transfer	X						X
Apply SI and English engineering units, including units for specific volume, pressure, and temperature	X	X					X
Demonstrate understanding of key concepts related to the first law of thermodynamics including internal, kinetic, and potential energy, work, heat transfer, and power cycles	X	X					X
Sketch T-v, p-v, and phase diagrams, and locate states on these diagrams	X						X
Apply mass and energy balances to control volumes	X	X					X
Describe the Carnot cycle	X						X
Evaluate entropy change between two states, and analyze isentropic processes	X	X					X
Demonstrate understanding of key concepts related to exergy analysis	X						X
Sketching schematic cycles and accompanying T-s diagrams	X	X					X
Define gas power cycles	X	X					X
Develop understanding of basic vapor-compression refrigeration and heat pump	X	X					X
Calculate p-v-T data using equations of state	X						X
Demonstrate basic understanding of humidity ratio, relative humidity, and Dew point temperature	X	X					X

1: an ability to identify, formulate, and solve complex engineering problems by applying the principles of engineering, science, and mathematics
2: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental, and economic factors
3: an ability to communicate effectively with a range of audiences
4: an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5: an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions
7: an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

CONTRIBUTION OF COURSE TO PROFESSIONAL COMPONENT
This course contributes to the engineering science component of the mechanical engineering program.

COURSE ORGANIZATION AND STUDENT PERFORMANCES ASSESSMENT

- Lecture Format

  This course consists of a two 50-minutes online sessions per day (MTWR). The course is a presentation and discussion with the students through Zoom. A recorded session will be also posted on Zoom. The two hours class time will be spent mostly explaining and discussing concepts, and solving relevant case problems. Student participation in class discussions is highly encouraged and rewarded.

- Exams

  There will be two regular take home exams plus a final take home one at the end of the semester. Each exam is based on two testing parts. A Theoretical part based on chapters reading is designed to test the students' ability to acquire a self-reading knowledge of the taught materials. A practical part is designed to test the students' ability to analyze and solve a set of problems. Each take home exam has a duration of 24 hours. The take home exam is based on the course materials developed between two consecutive exams. You are expected to upload the exam on D2L Dropbox on the due date and time. No make-up exam will be given.

- Homework & Quizzes

  Homework will be assigned from a set of chosen chapters by the instructor. Organized, neat with appropriate content, homework have to be uploaded on D2L Dropbox on the due date. Each student is responsible for submitting his own individual personal homework written in his own words. No dual or group homework copy is accepted unless specified by the instructor.

- Course Grade

  The final grade for the course will be based on the scores earned in the two regular exams, the final exam, the average score earned in the homework, and a score for the student attitude. The first exam contributes 10%, the second exam contributes 25%, the third exam contributes 35%, homework average contributes 20%, and participation, neatness, and attitude contribute 10%, for a total of 100%. The overall average score (X) for the course is determined as follows:

  X =0.10 x (exam1 score) + 0.25 x (exam 2 score) + 0.35 x (third exam score) + 0.20 x (homework average score) + 0.10 x (participation/neatness/attitude scores).The final letter grade for the course is based on the value of X and is determined from the following grade levels:

GENERAL GUIDELINES

- Plan on spending at least 6 hours outside of class to study the material and to work on homework assignments.
- Read the course material before the online class.

- Use a systematic approach to solve problems. If a problem involves drawing a graph, use Excel, Matlab, or any other graphic software tool to draw the graph. In engineering, neatness is a must, not a luxury.
- You are strongly encouraged to study in group.

GENERAL EDUCATION STATEMENT

Students in this course must demonstrate their competency in oral and written communication through written homework assignments, and exams. They must also demonstrate their ability to use the English language.

DISABILITY SUPPORT SERVICES

Students registered with Disability Support Services should have a letter verifying their disability and the appropriate accommodations.

DISCLAIMER STATEMENT

Information contained in this syllabus other than the grading policy may be subject to change with advance notice, as deemed appropriate by the instructor.

Prepared by: Dr. Salim Azzouz
Date: 05/19/2020