

MENG 3401 – Thermodynamics
Course Syllabus

Semester / Year	Summer I 2022								
Catalog Description	Thermodynamic properties of pure substances. Definitions of work, heat, and energy. First and second laws of thermodynamics and its application to fixed mass systems and control volumes. Analysis of thermodynamic cycles and their components.								
Prerequisites	<ul style="list-style-type: none"> • ENGR 2302 Dynamics • PHYS 2325 Physics I • PHYS 2125 Physics I Lab 								
Section number	006								
Instructor name	Dr. Muath Bani Salim								
Contact info	Office: RBN 3011, Phone: 903-565-6502, msalim@uttyler.edu								
Class Type / Location	Online								
Class Time	Online								
Office Hours	<ul style="list-style-type: none"> • 11:00 am – 12:00 pm Tue-Wed • Or by appointment 								
Credits	4 credits								
Required Textbook	Fundamentals of Engineering Thermodynamics, 9th Edition, by Michael J. Moran, Howard N. Shapiro, Daisie D. Buettner, Margaret B. Bailey (ISBN: 978-1-119-39138-8)								
Optional References	<ul style="list-style-type: none"> • Yunus A. Cengel and Michael A. Boles, Thermodynamics: An Engineering Approach, 9th Edition. • Energy, Entropy and Engines: An Introduction to Thermodynamics by Sanjeev Chandra, John Wiley and Sons, 2016 								
Additional requirements	N/A								
Evaluation Method	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Quizzes</td> <td style="text-align: right;">20%</td> </tr> <tr> <td>Homework assignments</td> <td style="text-align: right;">20%</td> </tr> <tr> <td>Midterm Exam</td> <td style="text-align: right;">25%</td> </tr> <tr> <td>Final Exam</td> <td style="text-align: right;">35%</td> </tr> </table> <p>Quizzes and Homework assignments: Assignments will be assigned according to the topics covered in lectures. Assignments are considered very important for the understanding of the course material. Completing your assignments independently is an absolute necessity to do well in this course.</p>	Quizzes	20%	Homework assignments	20%	Midterm Exam	25%	Final Exam	35%
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	<p>Canvas: Course syllabus, course material such as handouts and example problems with solutions, homework, assignments, homework solutions, review material will all be posted on Canvas. Please review all the material posted on Canvas regularly.</p> <p>All exams and quizzes will be online and available on Canvas at a specific date. Refer to table #3 to see the exact dates. Once you view the exam or the quiz on Canvas, you will have limited time to complete it.</p>
Grading Policy / Scale	Letter grade: A: 90 - 100, B: 80 – 89, C: 70-79, D: 60 – 69, F: <60
Attendance / Makeup policy	<p>Attendance is not required since this is an online offering.</p> <p>No makeup exams will be authorized without providing an official document showing that your absence is in line with university rules</p>
Course Learning Outcomes (CLO)	<p>By the end of this course students will be able to:</p> <ol style="list-style-type: none"> 1. Determine properties of substances (Applying appropriate physical models of state for a substance). 2. Calculate the work done by and heat taken in by a system undergoing a change of state (reversibly and irreversibly). 3. Perform first and second law analysis of steady-state flow systems (heat exchangers, turbines, pumps, condensers, boilers, and throttle valves). 4. Perform analysis of thermodynamic cycles (e.g., Carnot, Rankine, and Brayton cycles). 5. Perform psychrometric analysis for heating/cooling processes.
Tentative Topics	See the two tables at the end of the syllabus
Other	N/A

University, College, and Department Policies:

1. Modifications

The instructor reserves the right to change this syllabus partially or fully at any point in time. Sufficient time and notice will be provided to the class before the activation of the changes.

2. UT Tyler Honor Code

Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

3. Student Standards of Academic Conduct

Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, or material which has been submitted within a different course without explicit approval of the instructor, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

- i. “Cheating” includes, but is not limited to:
 - copying from another student’s test paper;
 - using, during a test, materials not authorized by the person giving the test;
 - failure to comply with instructions given by the person administering the test;
 - possession during a test of materials, or devices and instruments allowing access to materials, which are not authorized by the person giving the test, such as class notes or specifically designed “crib notes” as well as cell phones, to name a few. The presence of textbooks constitutes a violation if they have been specifically prohibited by the person administering the test;
 - using, buying, stealing, transporting, or soliciting in whole or part the contents of an unadministered test, test key, homework solution, or computer program;
 - collaborating with or seeking aid from another student or person during a test or other assignment without explicit authorization;
 - discussing the contents of an examination with another student who will take the examination;
 - divulging the contents of an examination, for the purpose of preserving questions for use by another, or removing material from the exam location, when the instructors has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student;
 - substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment;
 - paying or offering money or other valuable thing to, or coercing another person to obtain an unadministered test, test key, homework solution, or computer program or information about an unadministered test, test key, home solution or computer program;
 - falsifying research data, laboratory reports, and/or other academic work offered for credit;
 - taking, keeping, misplacing, or damaging the property of The University of Texas at Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and
 - misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially.
- ii. “Plagiarism” includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another’s work and the submission of it as one’s own academic work offered for credit.
- iii. “Collusion” includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.
- iv. All written work that is submitted will be subject to review by plagiarism software.

- v. Penalty for any related infractions will be decided at the discretion of the instructor including, but not limited to, granting of a failing grade in part or the course or in the entire course.

4. Students Rights and Responsibilities

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: <http://www.utt Tyler.edu/wellness/rightsresponsibilities.php>

5. Important Covid-19 Information for Classrooms and Laboratories

Students are expected to wear face masks covering their nose and mouth in public settings (including classrooms and laboratories). The UT Tyler community of Patriots views adoption of these practices consistent with its Honor Code (Links to an external site.) and a sign of good citizenship and respectful care of fellow classmates, faculty, and staff.

Students who are feeling ill or experiencing symptoms such as sneezing, coughing, digestive issues (e.g. nausea, diarrhea), or a higher than normal temperature should stay at home and are encouraged to use the UT Tyler COVID-19 Information and Procedures (Links to an external site.) website to review protocols, check symptoms, and report possible exposure. Students needing additional accommodations may contact the Office of Student Accessibility and Resources at University Center 3150, or call (903) 566-7079 or email saroffice@utt Tyler.edu

6. Recording of Class Sessions

Class sessions may be recorded by the instructor for use by students enrolled in this course. Recordings that contain personally identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of students enrolled in the course and only for educational purposes. Course recordings should not be shared outside of the course in any form without express permission.

7. Campus Carry

We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at <http://www.utt Tyler.edu/about/campus-carry/index.php>

8. UT Tyler a Tobacco-Free University

All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors.

Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless

tobacco, snuff, chewing tobacco, and all other tobacco products.

There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support.

For more information on cessation programs please visit www.utt Tyler.edu/tobacco-free.

9. Grade Replacement/Forgiveness and Census Date Policies

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at <http://www.uttyler.edu/registrar>. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions of which students need to be aware. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

10. State-Mandated Course Drop Policy

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date).

Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

11. Disability/Accessibility Services

In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Texas at Tyler offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including a non-visible diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit <https://hood.accessiblelearning.com/UTTyler> and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with Cynthia Lowery, Assistant Director of Student Services/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at <http://www.uttyler.edu/disabilityservices>, the SAR office located in the University Center, # 3150 or call 903.566.7079.

The University of Texas at Tyler has a continuing commitment to providing reasonable accommodations for students with documented disabilities. Like so many things this Fall, the need for accommodations and the process for arranging them may be altered by the COVID-19 changes we are experiencing and the

safety protocols currently in place. Students with disabilities who may need accommodation(s) in order to fully participate in this class are urged to contact the Student Accessibility and Resources Office (SAR) as soon as possible, to explore what arrangements need to be made to ensure access. During the Fall 2020 semester, SAR will be conducting all appointments via ZOOM. If you have a disability, you are encouraged to visit <https://hood.accessiblelearning.com/UTTyler> and fill out the New Student Application. For more information, please visit the SAR webpage at <http://www.uttyler.edu/disabilityservices> or call 903.566.7079.

Student Absence due to Religious Observance

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

12. Student Absence for University-Sponsored Events and Activities

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

13. Social Security and FERPA Statement

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

14. Emergency Exits and Evacuation

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

15. UT Tyler Resources for Students

- UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu
- UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu
- The Mathematics Learning Center, RBN 4021, this is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses.
- UT Tyler Counseling Center (903.566.7254)



Table 2: List of Tentative Topics

Day	Date	Topics
Tue	May 31 st	Welcome to Thermodynamic Syllabus Thermodynamics and Energy
Wed	1-Jun	Properties of a system State and Equilibrium Temperature & Pressure
Thu	2-Jun	Energy Energy Transfer
Fri	3-Jun	Energy Transfer by Heat Energy Transfer by Work The First Law of Thermodynamics
Mon	6-Jun	Energy Conversion Efficiencies Evaluating Properties
Tue	7-Jun	Phase-change Processes Saturated Liquid Superheated Vapor
Wed	8-Jun	Ideal gas Compressibility + problem solving
Thu	9-Jun	Energy Analysis of Closed Systems Boundary Work Energy Balance for Closed Systems
Fri	10-Jun	Specific Heats Internal Energy, Enthalpy
Mon	13-Jun	Specific Heats of Solids and Liquids Thermodynamic Aspects of Biological Systems Problem-solving Problem-solving
Tue	14-Jun	Midterm / On Canvas
Wed	15-Jun	Control Volume Analysis Using Energy Flow Work and The Energy of a Flowing Fluid
Thu	16-Jun	Problem-solving



		Energy Analysis of Steady-flow Systems
Fri	17-Jun	Energy Analysis of Steady-flow Systems Some Steady-flow Engineering Devices
Mon	20-Jun	Energy Analysis of Unsteady-flow Processes Energy Analysis of Unsteady-flow Processes
Tue	21-Jun	Problem-solving The 2nd Law of Thermodynamics
Wen	22-Jun	Heat Engines Thermal Efficiency
Thu	23-Jun	Refrigerators and Heat Pumps Performance of Refrigerators
Fri	24-Jun	Reversible and Irreversible Processes The Carnot Cycle
Mon	27-Jun	Carnot Heat Engine& Carnot Refrigerator Problem-solving
Tue	28-Jun	Problem-solving for chapters 4 &5 Problem-solving for chapters 4 &5
Wed	29-Jun	Entropy Rankine and Brayton cycles
Thu	30-Jun	Psychrometry Psychrometry
Fri	1-July	Final Exam



Table 3: Course Calendar

Month	Mon	Tue	Wed	Thu	Fri	Sat	Sun
May 2022	30	31 Classes begin	1	2 Quiz#1	3	4	5
Jun 2022	6 HW#1 due	7 Quiz#2	8	9	10 Quiz#3 HW#2 due	11	12
	13	14 Midterm	15	16 HW#3 due	17 Quiz#4	18	19
	20	21 Quiz#5	22 HW#4 due	23	24 Quiz#6	25	26
	27	28 Quiz#7	29 HW#5 due	30	July 1 Final exams	2 End of Summer I Session	3