The University of Texas at TYLER
COLLEGE OF ENGINEERING

Department of Mechanical Engineering
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MENG 3211 – Thermal-Fluids Laboratory

Semester / Year	Spring 2020
Catalog Description	Introduction to basic Thermal/Fluid sciences laboratory procedures and practices. Experimental topics to include fluid flow, heat exchanger basics, and basics of refrigeration. Student teams will design, analyze and document an experimental procedure. All procedures will result in a professional quality laboratory report
Prerequisites	**MENG 3210 (Experimental Measurement and Techniques), MENG 3401 (Thermodynamics) and MENG/CENG 3310 (Fluid Mechanics)**.
Section number	030/031
Instructor names	Ola Al-Shalash, Graduate Instructor of Record M. A. Rafe Biswas, Assistant Professor Department of Mechanical Engineering
Contact info	Ola Al-Shalash Office: Houston Engineering Center B222 E-mail: oalshalash@uttyler.edu M. A. Rafe Biswas Office: Houston Engineering Center A214 E-mail: mbiswas@uttyler.edu Phone: (903) 566-6115
Class Type / Location	Face-to-face –HEC Room # B222 (occasionally B215)
Class Time	Choose any one class meeting from the following: Lecture 030: Tuesday 8:00 – 8:55 am, Room B210 Lecture 031: Thursday 8:00 – 8:55 am, Room B210 Attend the one required lab meeting based on your myuttyler enrollment: Lab Section 030L: Tuesday 2:00PM - 4:45 pm, Room B222/B215 Lab Section 031L: Wednesday 8:00AM - 10:45, Room B222/B215 Lab Section 032L: Thursday 2:00PM - 4:45 pm, Room B222/B215 Lab Section 033L: Friday 8:00AM - 10:45, Room B222/B215
Office Hours	Ola Al-Shalash Office Hours: By appointment. M. A. Rafe Biswas Office Hours: MTTh 10:00 – 12:00 pm & W 2:00 – 4:00 pm or By appointment.
Credit Hours	2 (1 hour lecture and 3 hours laboratory per week).
Required Textbook	(T) Introduction to Thermal Fluid Laboratory, 1st ed., by M. A. Rafe Biswas, OER grant, 2019-2020. (Electronic chapters to be posted on Canvas)

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Optional References	Textbooks from Experimental Measurements and Techniques Lab (by Tyler Hall), Fluid Mechanics, Thermodynamics and Heat Transfer. In addition, (T) Morris, Alan S. Langari, Reza. (2012). Measurement and Instrumentation - Theory and Application. Elsevier. (https://app.knovel.com/hotlink/toc/id:kpMITA0001/measurement-instrumentation/measurement-instrumentation) (T) Design of Fluid Thermal Systems, 4th ed. (SI edition), by W.S. Janna, Cengage Learning, 2010
Additional requirements	Handouts and operating manuals posted on Canvas including FE Handbook (also visit ncees.org/exams/fe-exam/) and scanned copy of J. K. Burgher, D. B. Thiessen and B. J. Van Wie, Desktop Learning Modules for Fluid Mechanics and Heat Transfer, Washington State University, 2013.
Evaluation Method	Grading Exams 30% Laboratory Reports 30% Project Reports 20% Assignments (Quiz, Participation & Conduct) 20%
Grading Policy / Scale	Letter grades Scale: A 90 – 100 B 80 – 89 C 70 – 79 D 60 – 69 F < 60
Important events / dates	Census date – January 27 Exam 1 date – week of February 24 Exam 2 date – week of April 14
Attendance / Makeup policy	Attendance to lecture classes is expected. Moreover, attendance to laboratory sessions is mandatory. All students must remain in the lab until the instructor dismiss them. Leaving the laboratory without the instructor consent will be considered as an absence and the following penalty will be applied. A student missing a laboratory activity will have zero in the laboratory assignment (report or other) and must work in a makeup assignment in order to avoid 10 points being dropped in an exam. An opportunity to make up the Exam 1 may be available to students with a university accepted excused absence. Other makeups are granted only in extreme cases and at the discretion of the instructor. Excused absence due to illness will require evidence of treatment by medical personnel or at a medical facility.

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Course Learning Objectives / ABET & PEOs relation	**Expected Learning Outcomes** By the end of this course students will be able to: 1. Apply fluid mechanics concepts for analysis of basic fluid mechanics experiments. 2. Apply heat transfer concepts for analysis of basic heat exchangers configurations. 3. Apply thermal system concepts for analysis of refrigeration and heat pump cycles, and psychrometrics processes. 4. Design, perform, and report results of a mechanical engineering experiment. 5. Write professional quality laboratory reports.
Tentative Topics	• Fluid mechanics laboratory procedures and devices. • Basic heat exchanger operation. • Basic psychrometrics and refrigeration/heat pump devices and operation. • Self-directed laboratory investigation.
Other	Note: Instructions on the written and oral report format/style, grading rubric and peer evaluation forms will be given separately on Canvas. Late submissions of assignments including quizzes, lab and project reports (e.g. if due at 11:59:00 pm, then any time after such as 11:59:30 pm is late) will result in 10% deduction per day (or 24 hours) from the graded score. All late assignments must be submitted on Canvas by last class day of the semester (Friday at 5 pm). After that time, all late assignments will result in automatic grade of zero.

Evaluation activities

- Exams: There will be two exams during the semester. Late or no submission for any exam results in automatic grade of zero. For correct answer with work shown will be full credit, but for wrong answer or no shown work may result in partial credit.

- Assignments (Quiz, Class Participation and Conduct): 8 to 10 quizzes need to be completed before each lab, in which the content may be covered, and quiz questions will be answered if the student proves that has tried to come up with the answer. Solution to assignments might not be provided. However, students can work on the right solution by checking their work with the instructor. Attendance is expected to lecture and laboratory classes, including taking notes and participating in discussions are required while in class. Participation on Canvas and joining a Group are mandatory for completion grade. Any violation of the Student Behavior (see below) or the Lab Safety form (see Canvas) will result in 1% of the total grade for each incident. Students may appeal the grade reduction to the instructor if valid excuse or reason can be given. A student missing a laboratory activity by 10 minute or more (e.g. arrive at 2:10:01 pm instead of at 2:00:00 pm) will have zero in the laboratory assignment and must work in a makeup assignment in order to avoid 1% being dropped from Class participation and conduct grade. A

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pre-lab draft report is required to be submitted as part of quiz or participation assignment before the beginning of the intended laboratory class.

- Lab Reports: For each laboratory activity, a report must be submitted before the beginning of the following laboratory class for grading on Canvas. Total of 7 lab activities. Instructions on lab report format/style and grading rubric will be given separately, but they are part of the Syllabus. In addition, each lab report should include an appendix section that shows list that shows which team member worked on what parts of the lab and how many hours spent so instructor may adjust each individual grade by +/- 5 pts compared to assigned group grade if appropriate. Peer Evaluation will have to be completed for at least 3 selected lab reports.

- Project Reports: Each student, part of a group, will work on one design lab project of a topic approved by the instructor. The default project options will cover the topic of heat exchanger to determine optimal configuration for maximum heat transfer. Students working in groups must propose the concept, demonstrate the experiment, and show the results of the project. Total of 3-4 reports to be submitted as increments (see Canvas). Each student must also fill out a Peer Evaluation form for each report before the end of the semester to help calculate the Peer/Instruction Evaluation factor that is added to the group project grade to determine individual project report grade. The factor is calculated based on how much higher or lower than the average peer evaluation points a student is. For each point higher or lower, 1 point will be added or deducted for the group grade to represent the student's individual project grade.

Grade appeal: grades can be appealed by sending a Canvas message in written or typed format and then meeting the instructor during office hours, but no later than a week after the grade has been given. However, no appeals can be made after the Monday following finals week.

Note that your final semester grade is based on the letter grade on Canvas. No curving or scaling will be applied even if you receive borderline grade such as 79.99. You get what you see on Canvas.

Student Behavior

- Academic dishonesty, in the form of cheating, fabrication, falsification, multiple submissions, plagiarism, and complicity, will not be tolerated. Regulations about academic dishonesty are contained in *A Student Guide to Conduct and Discipline at UT Tyler*, which may be obtained from the Office of Student Affairs.
- The Student Conduct and Lab Safety Form available electronically should be used to follow guidelines and will be used to assess part of Assignment grade.
- **The use of cellular phones during the class and lab is prohibited**.
- **No food or drink is allowed in the classroom or laboratories**.
- Student attitude: Given this is a professional, educational setting you are expected to dress and behave appropriately including wearing full pants and closed-toed shoes. A positive, mature attitude/behavior is expected from the students in all classes (lectures and laboratories). Students disturbing directly or indirectly the class or other students will be asked to leave the classroom or laboratory with the consequences associated to an absence.
- Students are encouraged to utilize any tutoring services available if needed and come prepared to each week's class and lab. Each student is expected to work with the group in a professional

manner. It is important to communicate clearly and professionally of any concerns or issues to the instructor or lab assistant, who will relay to the instructor if they cannot be resolved independently.

- Canvas should be the primary mode of contacting the instructors so check the Canvas announcements and discussion board to check for information about the course. In addition, university provided patriots email should be official communication mode for topics outside the class and you should check your email regularly. If you email us, please allow upto 24 hours to respond on weekdays and 48 hours on weekends. If you call us and we don't answer, then please leave a voicemail with your name and reason for calling so we can call or email back. Otherwise the phone call will not be responded to.

University Policies:

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.

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.uttyler.edu/wellness/rightsresponsibilities.php

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.uttyler.edu/about/campus-carry/index.php

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.uttyler.edu/tobacco-free.

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.

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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

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.

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.

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.

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.

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.

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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.

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, 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 which are not authorized by the person giving the test, such as class notes or specifically designed "crib notes". 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 during a test or other assignment without authority;
   - 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, 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.

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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.

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)

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Week of		Lecture Activity	Lab Activity
Jan	14	Course Introduction/Syllabus	No Lab
	21	Major Losses in Pipes/Uncertainty Analysis	Lab Introduction, Join a group on CANVAS / Info on MathCad/MATLAB Live Editor
	28	Minor Losses in Pipes	Lab 1 - Losses in Pipes
Feb	4	Flow Meters/Venturi Flow	Lab 2 - Venturi
	11	Flow through an Orifice	Lab 3 - Flow through an orifice
	18	Psychrometrics	Project expectations and instructions
	25	Exam 1	Work on Assignment/Project
Mar	3	Heat Exchangers I	Lab 4 – Psychrometrics
	10	No Class – Spring Break	No Class – Spring Break
	17	Heat Exchangers II	Lab 5 - Heat Exchangers I
	24	Heat Exchangers III	Lab 6 - Heat Exchangers II
	31	Work on Project	Initial Project Report due (Intro including Lit Review & References)
Apr	7	Refrigeration and Heat Pump Cycles	Lab 7 - Heat Exchangers III
	14	Exam 2	Work on Assignment/Project
	21	Work on Project	Progress Project Report due (add Methodology, Results & Discussion)
	28	Final Project Report/Peer Evaluation due (No class)	No lab