MEET 4360 EXPERIMENTAL THERMAL SCIENCES
Spring 2022
Mon. 9:30AM - 12:20PM (Lab), Wed. 5:30PM- 7:20PM (Lecture)

Instructor	Dr. Weihuan Zhao
Office Hours	Half hour before and half hour after each session (for both lecture and lab sessions) Or by appointment (weihuan.zhao@unt.edu)
Contact Info	weihuan.zhao@unt.edu, 940-369-5929. Office: NTDP F115G (Mechanical Engineering Department)
TA	Mr. Hossain Ahmed
Office Hours	Tuesday: 3:00 pm to 4:30 pm; Friday: 12:00 pm to 1:00 pm. TA room (NTDP D206A), desk no 1. Or by appointment (hossainahmed@my.unt.edu)
Contact Info	hossainahmed@my.unt.edu

Course Description
Designing and conducting experiments in fluid mechanics, hydraulics, thermodynamics and heat transfer. Pre-Requisites: MEET 3940, 3990 and 4350 or concurrent enrollment.

Course Learning Outcomes (ETAC of ABET program outcomes addressed)
Upon successful completion of this course, students will be able to:

1. Understand current methods and instrumentation to measure fundamental parameters of thermal-fluid systems including temperature, pressure, and flow. (1, 4)
2. Use measurement methods for performance analysis of major thermal applications including vapor power cycles, air-conditioning, refrigeration, heat exchangers. (1, 4)
3. Learn fundamentals of building heating/cooling load calculations. (1)
4. Understand basics of building energy assessment. (1, 4)
5. Become familiar with modern data acquisition and analysis methods and tools. (4)
6. Design instrument systems for specified tasks. (2, 4)

Recommended Textbook
Cengel, Y., Cimbala, J., and Turner R., Fundamentals of Thermal-Fluid Sciences 5th Edition, McGraw Hill, 2017. ISBN: 9780078027680.
Cengel, Y.A., Boles, M.A., Kanoglu, M., Thermodynamics, An Engineering Approach 9th edition, McGraw Hill, 2019. ISBN: 978-1-259-82267-4.

Course Outline
Table 1 shows a tentative course outline. Instructor will attempt to follow it closely and reserve the right to substitute any other relevant material at any point throughout the course.

Grading Criteria

Midterm Exam	25%
Final Exam	30%
Lab Assignments	40% *(see Policies and Procedures #6)*
Attendance, Attitude, Participation	5%

Expected Grade Distribution
A: ≥90%, B: 80-89%, C: 70-79%, D: 60-69%, F: <60%

Policies and Procedures

1. This syllabus is subject to change during the semester with changes to be announced in class.

2. This course provides opportunities for students to take advantage of software packages (such as NI LabView), and equipment (such as data acquisition systems, temperature/pressure/flow sensors, infrared cameras, wind tunnel) supported by the department in the classroom or in lab experiments, in simulation studies, homework assignments, or in projects.
3. The lectures and labs will be held in the classrooms indicated in ***Table 1*** during the assigned lecture and lab class meeting times.
4. The course website, Canvas, at https://canvas.unt.edu/ will be used for posting announcements, course materials, recorded meetings, assignments, and grades. Students are encouraged to check the course website often.
5. Students will complete regularly assigned lab reports. **The lab reports must be submitted on time - by the following week on Monday at 9:30 a.m. - for grading. Late submissions will get a grade of zero**. The reports should be submitted in pdf format through the Canvas.
6. **There will be no make-up exams or assignments unless you have a documented, university-excused absence.** If you know in advance that you will miss an exam, you must contact instructor before the scheduled exam.
7. **Exams will be closed book, closed notes.**
8. **Calculator.** Graphing calculators will not be allowed during exams. Only NCEES-approved calculators can be used in exams (http://ncees.org/exams/calculator/). **Acceptable calculators are:**
    - Casio: All fx-115 and fx-991 models (Any Casio calculator must have "fx-115" or "fx-991" in its model name.)
    - Hewlett Packard: The HP 33s and HP 35s models, but no others.
    - Texas Instruments: All TI-30X and TI-36X models (Any Texas Instruments calculator must have "TI-30X" or "TI-36X" in its model name.)
9. Grades are based in part on the student's ability to communicate. You must present your work in a well-organized and well-articulated manner with appropriate depth.
10. Requests for the review of a graded exam/assignment must be made within one week of the grade announcement. Upon review, the exam/assignment score may increase, remain the same, or decrease.
11. An "I" (incomplete) grade is given only for extenuating circumstances and in accordance with University and Departmental Policies.
12. The instructor reserves the right to change the grade distribution at the end of the semester. If any changes occur, the changes will be less stringent than the distribution above.
13. **Technical Assistance**. At UNT, we have a Student Help Desk that you can contact for help with Canvas or other technology issues.
    UNT Help Desk: UNT IT Help Desk | University Information Technology (https://it.unt.edu/helpdesk)
    Email: helpdesk@unt.edu
    Phone: 940-565-2324
    In Person: Sage Hall, Room 330
    Walk-In Availability: 8am-5pm (Monday-Friday)
    Support Hours:
    - Monday–Thursday: 8am – 9pm
    - Friday: 8am- 5pm
    - Saturday: 11am- 3pm

    For additional support, visit Canvas website (https://canvas.unt.edu/; techsupport.unt.edu)
14. **Rules of Engagement**. Rules of engagement refer to the way students are expected to interact with each other and with their instructors. Here are some general guidelines:
    - While the freedom to express yourself is a fundamental human right, any communication that utilizes cruel and derogatory language on the basis of race, color, national origin, religion, sex, sexual orientation, gender identity, gender expression, age, disability, genetic information, veteran status, or any other characteristic protected under applicable federal or state law will not be tolerated.

- Treat your instructor and classmates with respect in any communication online or face-to-face, even when their opinion differs from your own.
- Ask for and use the correct name and pronouns for your instructor and classmates.
- Speak from personal experiences. Use "I" statements to share thoughts and feelings. Try not to speak on behalf of groups or other individual's experiences.
- Use your critical thinking skills to challenge other people's ideas, instead of attacking individuals.
- Avoid using all caps while communicating digitally. This may be interpreted as "YELLING!"
- Be cautious when using humor or sarcasm in emails or discussion posts as tone can be difficult to interpret digitally.
- Avoid using "text-talk" unless explicitly permitted by your instructor.
- Proofread and fact-check your sources.
- Keep in mind that online posts can be permanent, so think first before you type.

See these Engagement Guidelines (https://clear.unt.edu/online-communication-tips) for more information.

15. **Academic Integrity Standards and Sanction for Violations**: According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University. Any violation of academic honesty in an exam or assignment will result in a grade of zero and a report to https://facultysuccess.unt.edu/academic-integrity.
16. **Acceptable Student Behavior**: Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc. The Code of Student Conduct can be found at deanofstudents.unt.edu/conduct.
17. **Access to Information- Eagle Connect**: Students' access point for business and academic services at UNT is located at: my.unt.edu. All official communication from the University will be delivered to your Eagle Connect account. For more information, please visit the website that explains Eagle Connect and how to forward e-mail: eagleconnect.unt.edu/.
18. **ODA Statement**: UNT makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one's specific course needs. Students may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the ODA website at disability.unt.edu.
19. **Attendance Policy**: Attendance to the fullest extent possible is highly encouraged, as discussions and demonstrations during both lecture and lab sessions contain important information to do well on exams. Responsibility for class attendance rests with the student. Student's level of attendance contributes up to 5% as described. An absence may be excused for the following reasons: a religious holy day, including travel for that purpose; active military service, including travel for that purpose; participation in an official university function; illness or other extenuating circumstances; pregnancy and parenting under Title IX; and when the University is officially closed by the President. The student is responsible for requesting an excused absence in writing as early in the semester as possible, and personally delivering to me satisfactory evidence to substantiate the excused absence.
20. **COVID-19 Impact on Attendance**. While attendance is expected as outlined above, it is important for all of us to be mindful of the health and safety of everyone in our community, especially given concerns about COVID-19. Please contact instructor if you are unable to attend class because you are ill, or unable to attend

class due to a related issue regarding COVID-19. It is important that you communicate with me prior to being absent so I may make a decision about accommodating your request to be excused from class. If you are experiencing any symptoms of COVID-19 (https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html) please seek medical attention from the Student Health and Wellness Center (940-565-2333 or askSHWC@unt.edu) or your health care provider PRIOR to coming to campus. UNT also requires you to contact the UNT COVID Hotline at 844-366-5892 or **COVID@unt.edu** for guidance on actions to take due to symptoms, pending or positive test results, or potential exposure. While attendance is an important part of succeeding in this class, your own health, and those of others in the community, is more important.

21. **Statement on Face Covering.** UNT encourages everyone to wear a face covering when indoors, regardless of vaccination status, to protect yourself and others from COVID infection, as recommended by current CDC guidelines. Face covering guidelines could change based on community health conditions.
22. **Course Safety Statement**: Students in the MEET 4360.101 (lab session) are urged to use proper safety procedures and guidelines. While working in laboratory sessions, students are expected and required to identify and use proper safety guidelines in all activities requiring lifting, climbing, walking on slippery surfaces, using equipment and tools, handling chemical solutions and hot and cold products. Students should be aware that the UNT is not liable for injuries incurred while students are participating in class activities. All students are encouraged to secure adequate insurance coverage in the event of accidental injury. Students who do not have insurance coverage should consider obtaining Student Health Insurance. Brochures for student insurance are available in the UNT Student Health and Wellness Center. Students who are injured during class activities may seek medical attention at the Student Health and Wellness Center at rates that are reduced compared to other medical facilities. If students have an insurance plan other than Student Health Insurance at UNT, they should be sure that the plan covers treatment at this facility. If students choose not to go to the UNT Student Health and Wellness Center, they may be transported to an emergency room at a local hospital. Students are responsible for expenses incurred there.
23. **Emergency Notification & Procedures**: UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Blackboard for contingency plans for covering course materials.
24. **Retention of Student Records**: Student records pertaining to this course are maintained in a secure location by the instructor of record. All records such as exams, answer sheets (with keys), and written papers submitted during the duration of the course are kept for at least one calendar year after course completion. Course work completed via the Blackboard online system, including grading information and comments, is also stored in a safe electronic environment for one year. Students have the right to view their individual record; however, information about students' records will not be divulged to other individuals without proper written consent. Students are encouraged to review the Public Information Policy and the Family Educational Rights and Privacy Act (FERPA) laws and the University's policy.
25. **Student Perceptions of Teaching Effectiveness (SPOT)**: Student feedback is important and an essential part of participation in this course. The student evaluation of instruction is a requirement for all organized classes at UNT. The survey will be made available during weeks 14 and 15 of the long semesters to provide students with an opportunity to evaluate how this course is taught. Students will receive an email from "UNT SPOT Course Evaluations via IASystem Notification" (no-reply@iasystem.org) with the survey link. Students should look for the email in their UNT email inbox. Simply click on the link and complete the survey. Once students complete the survey they will receive a confirmation email that the survey has been submitted. For additional information, please visit the spot website at www.spot.unt.edu or email spot@unt.edu.

Link for **Spring 2022 Final Exams - Discovery Park**
https://registrar.unt.edu/exams/final-exam-schedule/spring

Table 1: Course Outline.

Week of	**LAB** Mon. 9:30am-12:20pm, *in **NTDP F158** unless otherwise noted*	**LECTURE** Wed. 5:30pm-7:20pm, *in **NTDP K120** unless otherwise noted*
1. 1/17/22	MLK Day (no lab)	Introduction, Temperature Measurements
2. 1/24/22	no lab	Pressure Measurements, Flow Measurements
3. 1/31/22	Lab 1. Temperature / Pressure Measurements ***Groups A1, A2, A3*** *(1 hour for each group)*	Vapor Power Cycles
4. 2/07/22	Lab 1. Temperature / Pressure Measurements ***Groups B1, B2, B3*** *(1 hour for each group)*	Refrigeration Processes
5. 2/14/22	Lab 2. Vapor Power Cycles ***Groups A1, A2, A3, B1, B2, B3 in NTDP F160***	Air-Conditioning Processes
6. 2/21/22	Lab 3. Refrigeration Processes ***Groups A1, A2, A3*** *(1 hour for each group)*	Convection Heat Transfer
7. 2/28/22	Lab 3. Refrigeration Processes ***Groups B1, B2, B3*** *(1 hour for each group)*	Heat Exchangers
8. 3/07/22	Lab 4. Air-Conditioning Processes ***Groups A1, A2, A3*** *(1 hour for each group)*	**Midterm Exam**
9. 3/14/22	Spring break (No classes)	
10. 3/21/22	Lab 4. Air-Conditioning Processes ***Groups B1, B2, B3*** *(1 hour for each group)*	Building Cooling-Heating Loads
11. 3/28/22	Lab 6. Convection Heat Transfer ***Groups A1, A2, A3*** *(1 hour for each group)*	Lab 5. Building Cooling-Heating Loads ***Groups A1-A3, B1-B3***
12. 4/04/22	Lab 6. Convection Heat Transfer ***Groups B1, B2, B3*** *(1 hour for each group)*	Building Energy Assessment, ANSYS FEA
13. 4/11/22	Lab 8. Heat Exchangers ***Groups A1, A2, A3*** *(1 hour for each group)*	ANSYS FEA, Lab 7. ANSYS Steady State Thermal Analysis ***Groups A1- A3 in NTDP F185***
14. 4/18/22	Lab 8. Heat Exchangers ***Groups B1, B2, B3*** *(1 hour for each group)*	ANSYS FEA, Lab 7. ANSYS Steady State Thermal Analysis ***Groups B1- B3 in NTDP F185***
15. 4/25/22	Fundamentals of Data Acquisition-LabView Basics ***(Lecture in NTDP K150)***	Lab 9. Fundamentals of DAQ system-LabView Basics ***Groups A1- A3 in NTDP F185***
16. 5/02/22	no lab	Lab 9. Fundamentals of DAQ system-LabView Basics ***Groups B1- B3 in NTDP F185***
	Final Exam (comprehensive) 5/11/22, Wednesday, 8:00-10:00am, **in NTDP K150**	