MTSE 5000: THERMODYNAMICS OF MATERIALS

Instructor Contact

Name: Prof. Srinivasan Srivilliputhur
Pronouns: He/Him
Office Location: Discovery Park C-136C
Phone Number: (940) 369-8273
Class Website: Lectures, assignments, exams, quizzes will be posted on CANVAS
Lecture: MON/WED 10:00 AM – 11:20 AM, DP B158
Office Hours: Thursday 3 PM or by appointment.
Email: srinivasan.srivilliputhur@unt.edu

Communication: CANVAS and Email will be the primary tools used to communicate with each other. I will get back to you no later than 48 hours. Efforts will be made to post exam grades within 2 weeks after an exam is administered. Assignments, quizzes, and exams will be submitted via CANVAS, and students will participate in CANVAS-based discussion board.

Welcome to UNT!

As members of the UNT community, we have all made a commitment to be part of an institution that respects and values the identities of the students and employees with whom we interact. UNT does not tolerate identity-based discrimination, harassment, and retaliation. UNT’s full Non-Discrimination Policy can be found in the UNT Policies section of the syllabus.

Course Objectives

This course will provide a strong foundation in thermodynamics of materials.

How to Study?

This is a problems-based class. The ability to solve numerical problems is the foundation of any thermodynamics course. Discuss thermodynamics principles with your classmates, and help each other understand the concepts by working in teams. But the work you turn in must be your own. You should not use homework solutions, exams, or other materials from others, and pass it off as your own work. Violations of the Academic Integrity code will be punished to the fullest extent.

Course Structure

The course will be in-class. Participation in the class during lectures is mandatory. The quizzes and homework assignments must be submitted as a PDF file on CANVAS itself.

Course Prerequisites or Other Restrictions

The students must possess a Laptop connected to the Internet and be able to log in to Zoom lectures. The student must be familiar with fundamentals of mathematics, especially calculus. A prior knowledge of partial derivative is assumed. I encourage all the students to review Calculus using calculus textbooks and/or video tutorials on khanacademy.org.
Textbook


Teaching Philosophy

I encourage student questions and participation during lecture. Students must be proactive in getting confusions clarified. To ensure this, I have a “Muddy Points Discussions” page on CANVAS with specific topics listed. The students must actively post their questions and also answer questions from other students. This section is based on the quality and quantity of your discussions.

Course Description

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<th>Course Outline</th>
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<tr>
<td>1. Fundamental concepts and definitions</td>
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<td>2. First law of thermodynamics</td>
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<td>3. Second law and entropy</td>
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<td>4. Statistical interpretation of entropy</td>
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<td>5. Free energy and Maxwell’s relations</td>
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<td>6. Heat capacity and third law</td>
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<td>7. Phase equilibrium in one-component systems</td>
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<td>8. Solution thermodynamics</td>
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<td>9. Binary and ternary phase equilibria</td>
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<td>10. Thermodynamics of point and planar defects</td>
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<td>11. Reaction thermodynamics</td>
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<td>12. Application of thermodynamics. For example, small systems and electrochemistry</td>
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Grading

An (A-F) grading scale will be used. The point percentages used to calculate the final grade are:

- A >= 90;
- B = 80-89;
- C = 70-79;
- D = 60-69;
- F = < 60

Your grading will be based on the following areas of assessment:

- Homework: 20%
- Two Quizzes: 10%
- Two Exams: 70%
- **Exam-1**: On October 13, 2021 during your class period.
- **Exam-2**: December 1, 2021. Please do not plan to leave for vacation before your exam.
- **Quiz-1**: 09/19/2021 (30-minute duration on CANVAS).
- **Quiz-2**: 11/14/2021 (30-minute duration on CANVAS).
Course Policies

Attendance Policy
Participation in class lectures is mandatory. If you are unable to attend a class, please email me. Excused absences include illness, conference travel, family emergency, religious holiday, and any other unplanned difficulty as determined by the instructor. Student(s) with 3 or more unexcused absences will be dropped from the class. Don’t disrupt classes by coming late.

Late Work Policy
Late work will lead to one letter grade drop unless a prior accommodation has been made with the professor. Late work will NOT be accepted if submitted after the answers are posted. There will be no extra credit opportunities.

Examination Policy
The exams are open or closed-book exams and will be administered via CANVAS. You will download the exam from CANVAS and have a fixed amount of time to complete it and upload your answer file back on CANVAS for grading. Work on your exam during a time you expect stable Internet connection. A student who misses exam(s) due to unavoidable reasons such conference travel, family emergencies, and sickness must show proof such as doctor’s and/or advisor’s note to the instructor to get permission and/or arrange for a makeup exam. Please do not plan your winter vacation travel before UNT closes. I will not reschedule your exam-02.

Assignment Policy
The instructions for assignments and their due dates will be posted on CANVAS. You must upload your answers in PDF files on CANVAS. Turnitin or similar software will be used to check your project report and your assignments.

Note that the University is committed to providing a reliable online course system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will extend the time windows and provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and contact the UNT Student Help Desk: helpdesk@unt.edu or 940.565.2324 and obtain a ticket number. The instructor and the UNT Student Help Desk will work with the student to resolve any issues at the earliest possible time.

Instructor Responsibilities and Feedback

- The instructor will help students grow and learn, provide clear instructions for projects and assessments, answer questions about assignments, identify additional resources as necessary, provide grading rubrics, review and update course content.
- Please help the instructor by being proactive in asking questions and seeking help.

Course Evaluation
Student Perceptions of Teaching (SPOT) is the student evaluation system for UNT and allows students the ability to confidentially provide constructive feedback to their instructor and department to improve the quality of student experiences in the course. SPOT evaluation window: November 16–December 3.

Syllabus Change Policy
Any changes to the syllabus (in an extraordinary situation) will be clearly communicated to the students.
Homework Guidelines

1. **Upload your homework solutions on CANVAS.** The key objective of this course is to enable you to apply thermodynamics principles to materials science problems. Homework exercises play a crucial role for this purpose and are mandatory. There will be about six sets of homework problems over the semester, with about ten problems per set.

2. **Collaborate with your peers.** Homework must be a result of your own effort. However, you are encouraged to discuss homework problems with your classmates before you work out detailed solutions. I will NOT tolerate cheating.

3. **Presentation must be professional.** The paper size must be 8-1/2" x 11". Write your name (last name first), the homework assignment number, and the due date on the "cover page." You must write only on one side of each sheet, and only inside the margins. Do the problems in the order assigned. Papers torn out from a spiral notebook are NOT acceptable. Number the pages in the upper right corner and staple in the upper left corner. BE NEAT! Your career will suffer if your work is sloppy, and you will also lose points in this course.

4. **Use SI Units and appropriate significant digits.** Your answers must include the correct units, unless the calculated quantity is dimensionless! You must round off the final answer appropriately – answers with digits that are not significant will result in a grade reduction.

5. **Grading:** The problems will be graded for bona fide attempt on a scale of one (lowest) to ten (highest). I will post solutions to the problems.

6. **Late Submissions will not be accepted.** Exceptions will be made only for documented conference attendances, and significant circumstances such as leave to attend funeral, hospitalization, and/or documented medical appointment.

7. **A Useful Problem-Solving Strategy:** You must learn to address thermodynamics problems in a structured manner, thus: (a) **Outline a solution.** Re-phrase the problem in your own words from a materials science perspective, add a sketch if needed. Explicitly state and justify all assumptions you make for solving the problem. List in words the quantities you are given and you need to solve for. Write down the necessary equations. (b) **Execute the solution.** (c) **Evaluate your solution.** Check its units and assess if it is physically reasonable.
COVID-19 Related Steps

**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 me if you are unable to attend class because you are ill, or unable to attend class due to a related issue regarding COVID-19 to help me accommodate your request.

**Statement on Face Covering**
I expect students in my class to practice proper hygiene, wear facemasks, and practice social distancing.

**Course Technology & Skills**

**Computer Skills & Digital Literacy**
Provide a list of course-specific technical skills learners must have to succeed in the course, such as:

- Using Canvas
- Using email with attachments
- Downloading and installing software
- Using spreadsheet programs
- Using presentation and graphics programs

**Technical Assistance**
Part of working in the online environment involves dealing with the inconveniences and frustration that can arise when technology breaks down or does not perform as expected. Here at UNT we have a Student Help Desk that you can contact for help with Canvas or other technology issues.

**UIT Help Desk:** [UIT Student Help Desk site](http://www.unt.edu/helpdesk/index.htm)
**Email:** helpdesk@unt.edu  **Phone:** 940-565-2324
**Canvas Technical Help**  ([https://community.canvaslms.com/docs/DOC-10554-4212710328](https://community.canvaslms.com/docs/DOC-10554-4212710328))

**Rules of Engagement**  ([Engagement Guidelines](https://clear.unt.edu/online-communication-tips))
Some expectations of how students should interact with each other and with their instructors include:

- While the freedom to express oneself is a fundamental 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.
- 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!”
  - Cautiously use 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.
Academic Integrity Policy
Academic Integrity Standards and Consequences. 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. Plagiarism and cheating will result in an F grade (Fail) for that assignment and a referral to the committee handling academic misconduct for further action.

ADA Policy
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 (https://disability.unt.edu/).

Prohibition of Discrimination, Harassment, and Retaliation (Policy 16.004)
The University of North Texas (UNT) prohibits discrimination and harassment because 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 in its application and admission processes; educational programs and activities; employment policies, procedures, and processes; and university facilities. The University takes active measures to prevent such conduct and investigates and takes remedial action when appropriate.

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 Canvas for contingency plans for covering course materials.

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. Visit UNT’s Code of Student Conduct (https://deanofstudents.unt.edu/conduct) to learn more.