

PHYS 320 “Thermodynamics and Statistical Physics”, Fall 2020

3 Credit Hours | Online

Laurence Lurio, Professor, Department of Physics

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Email: llurio@niu.edu (Best way to reach me)

Other Methods of contact

Office Hours: By appointment

Office Location: FW 206

Course Meeting

TuTh 3:30 PM – 4:45 PM Online (100%) Aug 25, 2020 - Dec 4, 2020

Exams may be in-person in FR 144 on the following dates: 9/8/2020, 9/24/2020, 11/3/2020, 11/19/2020, 12/8/2020. Depending on the class progress some exams may be changed to on-line.

Students can make up missed classes by viewing recordings of synchronous sessions which will be posted to the class web page.

Course Description

Concept and measurement of temperature. Study of the first and second laws of thermodynamics, entropy, and the statistical theory of simple systems. PRQ: PHYS 283, MATH 232.

This course includes **synchronous (live) online sessions**.

Course Resources

Required Resources

- Required Texts: Classical and Statistical Thermodynamics, A. H. Carter Optional Texts: .

Technology Requirements

- [Browser compatible with Blackboard¹](#) (Chrome or Firefox is recommended in most cases)
- To find out if your computer is ready for online courses, please see the [computer checklist²](#).

Course Overview

Course Objectives (CO) and Related Assessments

Upon completion of this course, you should be able to:

- CO1: Students should be able to represent the properties of materials using thermodynamic variables.
- CO2: Students should be able to apply the laws of thermodynamics to derive relationships between these thermodynamics variables.
- CO3: Students should be able to apply thermodynamics to the analysis of applications in physics engineering, chemistry and biology

Assignment Overview

Discussion board participation (10%)

Homework Problems (20%)

These will include essays, as well as some calculational and programming exercises

Quizzes (20%)

This will included quizzes on readings and web presentations.

Midterm Exam (20%)

Students will work in teams to produce short video presentations on topics in the course.

Final Exam (30%)

Grading Scale

| | | |
|----|---|---------|
| A | = | 93-100% |
| A- | = | 90-92% |
| B+ | = | 87-89% |
| B | = | 83-86% |
| B- | = | 80-82% |
| C+ | = | 77-79% |
| C | = | 73-76% |
| C- | = | 70-72% |
| D | = | 60-69% |
| F | = | 0-59% |

Course Calendar

| Month | Date | Topic | Chapter |
|-----------|------|--------------------------|---------|
| August | 25 | Nature of Thermodynamics | 1 |
| | 27 | | 1 |
| September | 1 | Equations of State | 2 |
| | 3 | | 2 |

| | | | | |
|--------------|----|---|----------------|----|
| | 8 | | Quiz | |
| | 10 | First law of thermodynamics | | 3 |
| | 15 | | | 3 |
| | 17 | | | 4 |
| | 22 | | | 4 |
| | 24 | | Quiz | |
| | 29 | | | 5 |
| October | 2 | | | 5 |
| | 6 | Second law of thermodynamics | | 6 |
| | 8 | | | 6 |
| | 13 | | Midterm | |
| | 15 | | | 7 |
| | 20 | | | 7 |
| | 22 | Thermodynamic Potentials | | 8 |
| | 26 | | | |
| | 29 | | | 8 |
| November | 3 | | Quiz | |
| | | The Chemical Potential and Open Systems | | |
| | 5 | | | 9 |
| | 10 | | | 9 |
| | 12 | The Third Law of Thermodynamics | | 10 |
| | 17 | | | 10 |
| | 19 | | Quiz | |
| | 24 | Kinetic Theory of Gass | | 11 |
| Thanksgiving | 26 | | | 11 |
| December | 1 | Statistical Thermodynamics | | 12 |
| | 4 | | | 12 |
| | | | 4:00 - 5:50 pm | |
| | 6 | Final Exam | | |

Course Guidelines

Time Commitment for Online Coursework

Plan on spending roughly nine (9) hours a week on this course. This will vary by student, so you may spend a bit more and less, but it's a good guideline.

Course Communication

- Course-wide communication** will most often come in the form of announcements through the Blackboard course site. New announcements will appear as a pop-up box when you enter the course and previous announcements will be available through a link on the left-hand navigation in the course site. I may use the Messages feature for quick reminders and check-ins and will respond to them when I am in the course site.

- **Instructor-initiated contact to individuals** will most often be done through the NIU email system.
- **For the quickest response from me**, email is the best way to reach out to me for the quickest response (as mentioned at the top of the syllabus). My goal is to respond to all emails within 24 hours during the work week. I may not be as readily available on the weekends.

Attendance and Participation

Attendance is expected during the weekly synchronous class sessions. Students who miss a session can view recordings of the session which will be made available on blackboard

Late, Missed, and Makeup Work

If you cannot submit work by the due date, please contact me via email to arrange for a possible extension. Generally, students can get extensions on one or two late assignments before credit is deducted.

Academic Integrity Statement

“Good academic work must be based on honesty. The attempt of any student to present as his or her own work that which he or she has not produced is regarded by the faculty and administration as a serious offense. Students are considered to have cheated if they copy the work of another during an examination or turn in a paper or an assignment written, in whole or in part, by someone else. Students are guilty of plagiarism, intentional or not, if they copy material from books, magazines, or other sources without identifying and acknowledging those sources or if they paraphrase ideas from such sources without acknowledging them. Students guilty of, or assisting others in, either cheating or plagiarism on an assignment, quiz, or examination may receive a grade of F for the course involved and may be suspended or dismissed from the university.”

Americans with Disabilities Statement

If you need an accommodation for this class, please contact the Disability Resource Center as soon as possible. The DRC coordinates accommodations for students with disabilities. It is located in the Campus Life Building, Suite 180, and can be reached at 815-753-1303 or drc@niu.edu.

Also, please contact me privately as soon as possible so we can discuss your accommodations. Please note that you will not be required to disclose your disability, only your accommodations. The sooner you let me know your needs, the sooner I can assist you in achieving your learning goals in this course.

Inclusivity Statements

- I am committed to making course content accessible to all students. If English is not your first language and this causes you concern about the course, please speak with me.
- Class rosters and University data systems are provided to faculty with the student's legal name and legal gender marker. As an NIU student, you are able to change how your preferred/proper name shows up on class rosters. This option is helpful for various student populations, including but not limited to: students who abbreviate their first name; students who use their middle name; international students; and transgender students.

A word about anxiety

These are extremely stressful times. You are not alone in feeling it. We are all living with unsettling uncertainty and it affects the way we perceive the world, ourselves and others. Such feelings may be persistent or may come on suddenly. Let's all promise to be patient with each other and help support a healthy learning environment. If you or somebody you know is struggling with anxiety or other issues, do not hesitate to reach out. Resources available include the DRC, Student Counseling Services or call 815-306-2777. As always, in the event of a crisis call for immediate help via 911 or other general support services listed here.

Changes to the Syllabus

This syllabus is a guide and every attempt is made to provide an accurate overview of the course and its requirements. However, certain circumstances may make it necessary for me to modify the syllabus during the semester for your benefit and the changes may depend, in part, on course progress and our needs. I will announce any change to the syllabus as early as possible so that you can adjust your schedule. The department/school will also be notified of any change.

¹ https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support

² <https://elearning.niu.edu/information/comChecklist.shtml>