NIU Course Syllabus for Physics 320

THERMODYNAMICS AND STATISTICAL PHYSICS

Fall Semester, 2015, Tuesday and Thursdays, 3:30-4:45 pm

Course Description:
      Concept and measurement of temperature. Study of the first and second laws of thermodynamics, entropy, and the statistical theory of simple systems. (In this course, we focus on the classical thermodynamics.)
Prerequisites : MATH 232 and PHYS 260 or PHYS 261 or PHYS 283.
Credits: 3

Course Goals:
1. Develop logical, objective, and critical thinking with scientific method using classical thermodynamics.
2. Develop the relationship between heat, work/energy, and potentials.
3. Develop advanced quantitative analysis skills and methods with advanced calculus and partial differential equations.

Student Learning Outcomes: Upon successful completion of the course, with advanced calculus and partial differential equations, students will be able to explain, analyze and/or apply:
- The first law of thermodynamics.
- The second law of thermodynamics with entropy.
- The thermodynamic potentials such as Gebbs function and Helmholtz function through Legendre transformations.
- The third law of thermodyamics.
- The Kinematic theory of gases. This is a bridge to statistical mechanics.

Class room: FR237
Instructor: Yasuo Ito.   La Tourette 218 and/or 101 (Electron Microscopy Lab)
                  Tel: 815-753-6477
                  e-mail: yito@niu.edu (preferred)
Office Hours: Tuesdays, and Thursdays, 2:00 pm – 3:00 pm; Other hours by an appointment.
Text book: Classical and Statistical Thermodynamics, A. H. Carter (required). Other references such as "*Heat and thermodynamics*" by Zemansky (out of print). Please read your textbook before coming to the class!!

The view graphs, homework assignments and their solutions will be posted on the Blackboard web course. Therefore, it is essential for you to familiarize with the Blackboard web course.

Grading (tentative)**:**

      5% Attendance. Attendance is *MANDATORY*. A student will receive attendance points if the student attends more than or equal to 85% of the course (25 out of 30 classes), according to the attendance rate. *Perfect attendance will receive extra credit points.* Students will not receive attendance points if he/she misses 6 - 9 classes. Students will receive *Negative* attendance points if he/she misses class more than 9 classes, **(-1/class)**.

      40% Homework *ESSENTIAL* Due one week of posting (Late penalty policy: 10% off)

      25% Midterm Exams **Thursday October 1st and October 29th in class**.

      30% Final Exam (comprehensive) **Tuesday December 8th**, 4:00 pm – 5:50 pm.

      To pass this course, you must score at least **50%** on the homework **AND** at least **50%** overall.

Grading scale:

      A ($90 \leq x$), A- ($85 \leq x < 90$), B+ ($80 \leq x < 85$), B ($75 \leq x < 80$), B- ($70 \leq x < 75$), C+ ($65 \leq x < 70$), C ($55 \leq x < 65$), D ($50 \leq x < 55$), F ($x < 50$).

Grade points (assigned by University)**:**

      A (4.00), A- (3.67), B+ (3.33), B (3.00), B- (2.67), C+ (2.33), C (2.00), D (1.00), F (0.00).

(Tentative schedule) *subject to change, depending on the progress of the class*

0: Introduction to the course   August 25, 2015.

1: **The Nature of Thermodynamics**   August 27, 2015

2: **Equations of State** (and a bit of 11: *The Kinetic Theory of Gases*)

3: **The First Law of Thermodynamics** (and Appendix A)

4: **Applications of the First Law**

Mid-Term I: October 1st, Final due date for Homework Ch1, Ch2, Ch3, A1, Ch4

5: Consequences of the First Law

6: The Second Law of Thermodynamics

7: Applications of the Second Law

Mid-Term II: October 29th, Final due date for Homework Ch5, Ch6, Ch7

8: **Thermodynamic Potentials**

9: Chemical Potential and Open Systems

10: The Third Law of Thermodynamics

(*12: Statistical Thermodynamics*)

May 3rd, Final due date for Homework Ch8, Ch9, Ch10

Final Exam (Tuesday. December 8th, 2015, 4:00 – 5:50 pm)

Accessibility Statement

Northern Illinois University is committed to providing an accessible educational environment in collaboration with the Disability Resource Center (DRC). Any student requiring an academic accommodation due to a disability should let his or her faculty member know as soon as possible. Students who need academic accommodations based on the impact of a disability will be encouraged to contact the DRC if they have not done so already. The DRC is located on the 4th floor of the Health Services Building, and can be reached at 815-753-1303 (V) or drc@niu.edu.