Physics 462/662: **3 credits** **FALL 2006**

HEAT AND THERMODYNAMICS

Instructor: Sylvio May, South Engineering 220A
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Description: Physics 462/662 gives an introduction into the thermodynamic formalism. Topics include equilibrium conditions, Legendre transformations, thermodynamic potentials, Maxwell relations, phase diagrams, stability of thermodynamic systems, properties of materials, and a brief introduction to irreversible thermodynamics. The course develops an understanding of thermodynamics and trains the ability to apply thermodynamic concepts.

Prerequisites: Physics 252 or consent of instructor

Meetings: 2:00-3:15 p.m., Tuesday and Thursday in Room 221, SE

Office hours: 10:30-11:45 a.m. Wednesday and Friday, or by arrangement

Textbook: Herbert B. Callen, *Thermodynamics and an Introduction to Thermostatistics, second edition*, (1985, John Wiley & Sons, Inc.)
Focus is on chapters 1-14.

Timing: Anticipated schedule of the lectures:

Time	Topic	Chapters
08/22/06 & 08/24/06	Postulates of Thermodynamics	1
08/29/06 & 08/31/06	Equilibrium Conditions	2
09/05/06	Formal Relationships	3
09/07/06	Sample Systems	3
09/12/06	Reversibility	4
09/14/06	Maximum Work Theorem	4
09/19/06 & 09/21/06	Legendre Transformations	5
09/26/06 & 09/28/06	Extremum Principles	6
10/03/06	Applications	6
10/05/06	**First Exam**	1-6
10/10/06 & 10/12/06	Maxwell Relations	7
10/17/06 & 10/19/06	Thermodynamic Stability	8
10/24/06 & 10/26/06	First Order Phase Transitions	9
10/31/06 & 11/02/06	First Order Phase Transitions	9
11/07/06	Phase Diagrams	9
11/09/06	**Second Exam**	7-9
11/14/06	Critical Phenomena	10
11/16/06	Nernst Postulate	11
11/21/06	Summary	12
11/23/06	no class (Thanksgiving)	
11/28/06 & 11/30/06	Properties of Materials	13
12/05/06 & 12/07/06	Irreversible Thermodynamics	14
12/12/06	**Third Exam**	10-14

Readings: Students are expected to read the appropriate chapters in the textbook, preferably before the corresponding lecture.

Homework: Homework will be assigned according to the following table

set	assignment date	due date
1	08/22/06	09/05/06
2	09/05/06	09/19/06
3	09/19/06	10/03/06
4	10/03/06	10/17/06
5	10/17/06	10/31/06
6	10/31/06	11/14/06
7	11/14/06	11/28/06
8	11/28/06	12/12/06

The homework should be handed in before the lecture. The instructor grades and returns each homework set no later than two weeks after the due date.

Exams: Schedule for the 3 exams:

Day	Time		Chapters	Points
10/05/06	2-3:15 p.m.	first exam	1-6	100
11/09/06	2-3:15 p.m.	second exam	7-9	100
12/12/06	2-3:15 p.m.	third exam	10-14	100

No makeup exams will be scheduled. The result of one exam can be dropped. That is, only the two best grades of the three exams count towards the final grade.

Grading: Grading will be based on the homework score (max 200pts) and the best 2 out of 3 exams (max 100pts+100pts=200pts). The maximal number or points is thus 400.

Bonus points (up to 100 pts) can be accumulated for excellent in-class participation, high-quality presentations on the blackboard, and very elegant homework solutions. The final grading scheme is:

Grade	Percentage	Points
A	89-100	≥ 356
B	79-89	316-355
C	69-79	276-315
D	59-69	236-275
F	0-59	0-235

Coursepack: Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor as soon as possible.

All work in this course must be completed in a manner consistent with NDSU University Senate Policy, Section 335: Code of Academic Responsibility and Conduct: http://www.ndsu.nodak.edu/policy/335.htm

Student Support Services offers free tutoring to NDSU undergraduates who qualify for the program. Applications available at Ceres 319 or contact Barbara.Welk@ndsu.edu or 701.231.8028.