

Physics 334: Thermal Physics Syllabus

Spring 2014

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Office Hours: Monday 10-12
Tuesday 9-10
Wednesday 10-11
Thursday 10-11

Text: Classical and Statistical Thermodynamics by Ashley H. Carter, ISBN# 0137792085
DO THE ASSIGNED READINGS PRIOR TO CLASS- this will allow you to become familiar with the terms and topics and have questions about the material prepared before lecture

Course Description:

Unified treatment of thermodynamics and statistical mechanics. Topics include state functions and variables, laws of thermodynamics, application to physical and chemical systems, kinetic theory, distribution functions, Fermi-Dirac and Bose-Einstein statistics, black-body radiation, and information theory.

Course Goals:

The main goal for this course is for students to develop an understanding of the basic concepts of work, heat, and energy and to apply these ideas to various thermodynamic processes and systems. Statistical aspects of thermodynamics will be studied beginning with the kinetic theory of gases and progressing to statistical mechanics treatment of systems. Students will also experience a wide variety of experiments throughout the course, connecting the practical elements to the conceptual and mathematical material of the covered.

Grading:

Your letter grade is determined by a minimum weighted average which is as follows: A/93, A-/90, B+/87, B/83, B-/80, C+/77, C/73, C-/70, D+/67, D/63, D-/60, F/0. The breakdown of the grading will be as follows:

Exam 1	10%
Exam 2	10%
Exam 3	10%
Homework	25%
Labs	30%
Final	15%

Course Materials:

All course materials will be made available on blackboard. These materials include this syllabus, laboratory procedures, and any solutions I may provide.

Exams and Quizzes:

There will be three exams during the semester. Each will be 50 minutes long. There will also be a final exam, which will be cumulative, but with heavy emphasis on material covered at the end of the course that has not previously appeared on an exam. Exams will include problem solving questions, but there may also be conceptually based questions to be answered with words.

Homework:

Homework assignments comprise a large percentage of your final grade. There will be short class work assignments due each day of class. During class we will discuss your solutions and determine if more time should be spent on any particular topic. Longer homework assignments will also be given, the due dates of which are listed on the schedule given in this syllabus. These assignments may not be thoroughly reviewed in class and instead will be graded outside of class by the instructor. Please feel

free to ask questions about the homework and to consult other sources, however the final assignment that is submitted must be your own work. Homework is very important. There is a strong correlation between completing the homework assignments and doing well on exams and in the course as a whole.

Attendance:

Attendance is mandatory and counts towards your final grade. If you cannot attend class for any reason, it is your responsibility to contact me with the reason for your absence and to obtain any material you missed. An absence will be considered excused and not count against your attendance grade if it is due to reasons such as illness, death in the family, etc. **Missed exams will only be excused in the event of excused absences, in which case another time can be scheduled to take the exam.**

Important Notes:

Education is all about open communication. My responsibility is to communicate information and problem solving techniques to you. However, communication works both ways. You must also communicate to me if are having trouble with or questions about any material. Your questions are always welcome. I do not know what you do not know. The explanations and examples I give make perfect sense to me, but you may need further clarification. To that end, please feel free to email me or attend my office hours with any questions you may have. If you cannot attend any of the available office hours, please email me and we can schedule another time to meet.

Disabilities and Medical Conditions:

Moravian College adheres to the principles and mandates of the Americans with Disabilities Act of 1990 and the Rehabilitation Act of 1973.

Students who wish to request accommodations in this class for a disability should contact Elaine Mara, assistant director of learning services for academic and disability support at 1307 Main Street, or by calling 610-861-1510. Accommodations cannot be provided until authorization is received from the Academic Support Center.

Special classroom set-ups, alternate testing, physical plant (campus) alterations, and other accommodations for students with documented disabilities are available on a case-by-case basis. It is the responsibility of students with disabilities to self-identify and request accommodation through the appropriate office.

It is the responsibility of the student to request accommodation well in advance of the need in order to give the College a reasonable amount of time to evaluate the documentation and implement the request. Classroom accommodation requiring notification to faculty must be requested for each semester for which it is needed.

Please see Disability Support Services in the Campus Offices and Services section elsewhere in the Moravian College Student Handbook for further information, and check the College's website for periodic updates concerning services for students with disabilities.

Academic Honesty Statement:

Academic integrity is the foundation on which learning at Moravian College, Moravian Theological Seminary, and the Comenius Center is built. Students are expected to perform their academic work honestly and fairly. In addition, students should neither hinder nor unfairly assist the efforts of other students to complete their work successfully.

In an academic community, students are encouraged to help one another learn. Because no two students learn in exactly the same way or absorb exactly the same things from a lecture, students are encouraged to study together. The boundaries on what is or is not acceptable work may not always be clear; thus, if at any point in academic work at Moravian, students are uncertain about their responsibility as scholars or about the propriety of a particular action, please see Academic Honesty in the Academic Life section elsewhere in the Moravian College Student Handbook for further information, and check the College's website for periodic updates.

Class Schedule

Date	Topic	Reading before class	Due
1/13	Equations of State 2.1-2.3	Chapter 2	
1/15	Equations of State 2.4-2.6		
1/17	The First Law of Thermodynamics	Chapter 3	HW 1
1/20	MARTIN LUTHER KING DAY		
1/22	Applications of the First Law 4.1-4.3	Chapter 4	
1/24	Applications of the First Law 4.4-4.6		HW 2
1/27	Consequences of the First Law	Chapter 5	
1/29	The Second Law of Thermodynamics 6.1-6.5	Chapter 6	
1/31	The Second Law of Thermodynamics 6.6-6.8		HW 3
2/3	Applications of the Second Law 7.1-7.5	Chapter 7	
2/5	Applications of the Second Law 7.6-7.8		
2/7	EXAM 1	CH 2, 3, 4, 5	
2/10	Thermodynamic Potentials 8.1-8.3	Chapter 8	
2/12	Thermodynamic Potentials 8.4-8.6		
2/14	Thermodynamic Potentials 8.7-8.9		HW 4
2/17	The Third Law of Thermodynamics	Chapter 10	
2/19	The Kinetic Theory of Gases 11.1-11.4	Chapter 11	
2/21	The Kinetic Theory of Gases 11.5-11.9		HW5
2/24	Statistical Thermodynamics 12.1-12.3	Chapter 12	
2/26	Statistical Thermodynamics 12.4-12.6		
2/28	EXAM 2	CH 6, 7, 8, 10	
3/3-7	SPRING BREAK		
3/10	Classical and Quantum Statistics 13.1-13.3	Chapter 13	
3/12	Classical and Quantum Statistics 13.4-13.6		
3/14	Classical and Quantum Statistics 13.7-13.9		HW 6
3/17	The Classical Statistical Treatment of an Ideal Gas 14.1- 14.3	Chapter 14	
3/19	The Classical Statistical Treatment of an Ideal Gas 14.4-14.6		
3/21	The Classical Statistical Treatment of an Ideal Gas 14.7-14.8		
3/24	The Heat Capacity of a Diatomic Gas 15.1-15.3	Chapter 15	HW 7
3/26	The Heat Capacity of a Diatomic Gas 15.4-15.6		
3/28	The Heat Capacity of a Solid	Chapter 16	
3/31	EXAM 3	CH 11, 12, 13, 14	
4/2	Bose-Einstein Gases 18.1-18.2	Chapter 18	
4/4	Bose-Einstein Gases 18.3-18.4		HW 8
4/7	Bose-Einstein Gases 18.5		
4/9	Fermi-Dirac Gases 19.1-19.2	Chapter 19	
4/11	Fermi-Dirac Gases 19.3-19.4		HW 9
4/14	Fermi-Dirac Gases 19.5		
4/16	Information Theory 20.1-20.3	Chapter 20	
4/18	EASTER BREAK		
4/21	EASTER BREAK		
4/23	Information Theory 20.4-20.5		
4/25	Information Theory 20.6-20.7		HW 10