

# Phys 451X: Statistical Physics Syllabus

Spring 2021

## Instructor Information

### Instructor

Wang Xu (Caleb)

### Email

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### Office Location & Hours

REIC 110, TBD

## General Information

### Course Description

Physics 451 is a two-credit course. Its content includes the partition function and Helmholtz free energy, Einstein and Debye solids, classical systems and the ideal gas, diatomic molecules, equipartition theorem, the blackbody spectrum, quantum statistics, Fermion and Boson systems...

### Lecture Schedule

Lectures: REIC 204/Mondays and Wednesdays, 3:30-4:30 pm

### Required Text

An Introduction to Thermal Physics by Daniel V. Schroeder (Addison Wesley Longman ISBN: 0-201-38027-7)

### Grading Policy

Homework	Quiz & Class participation	Midterm	Final	Total
45%	15%	15%	25%	100%

Your final grade for this course will be based on a bell curve. The average of the curve will be the breakpoint between letter grade B- and C+. The standard deviation of the grade point distribution will separate subsequent letter grades.

## Lecture Schedule

Week	Topic	Reading	Dates	HWK Due Date
Week 1	The Boltzmann Factor	Ch6:1, 6:1-2	01/11, <u>01/13</u>	01/20
Week 2	Average Values	Holiday, 6:2	<del>01/18</del> , <u>01/20</u>	01/27
Week 3	The Equipartition Theorem & The Maxwell Speed Dis.	Ch6:3, 6:4	01/25, <u>01/27</u>	02/03

Week	Topic	Reading	Dates	HWK Due Date
Week 4	Partition Function and Free Energy & PF for Composite Systems	Ch6:5, 6:6	02/01, <u>02/03</u>	02/10
Week 5	Ideal Gas Revisited	Ch6:7, 6:7	02/08, <u>02/10</u>	02/17
Week 6	The Gibbs Factor	Ch7:1, 7:1	02/15, <u>02/17</u>	02/24
Week 7	Bosons and Fermions	Ch7:2, 7:2	02/22, <u>02/24</u>	03/03
Week 8	Reviews	Review, <b>Midterm</b>	03/01, <u>03/03</u>	03/17
Week 9		Spring Break	03/08,03/10	
Week 10	Degenerated Fermi Gases	Ch7:3, 7:3	03/15, <u>03/17</u>	03/24
Week 11	Blackbody Radiation	Ch7:4, 7:4	03/22, <u>03/24</u>	03/31
Week 12	Debye Theory of Solids	Ch7:5, 7:5	03/29, <u>03/31</u>	04/07
Week 13	Bose-Einstein Condensation	Ch7:6, 7:6	04/05, <u>04/07</u>	04/14
Week 14	Weakly Interacting Gases	Ch8:1, 8:1	04/12, <u>04/14</u>	04/21
Week 15	The Ising Model of Ferromagnet	Ch8:2, 8:2	04/19, <u>04/21</u>	04/28* (optional)
Week 16	Reviews	Review, <b>Final</b> , -----	04/26, <u>04/28</u>	

### Exam Schedule

Date	Time	Subject
03/03	03:30pm - 04:30pm	Mid-term
04/28	03:15pm - 05:15pm	Final Exam (TBD)

### Additional Requirements & Policy

#### Homework:

On average, 1-5 problems will be assigned each week on **Wednesday**. The homework will be due by 03:30 pm the **following Wednesday**. All homework assignments must be turned in directly to me in class. No emailed or otherwise, electronically-submitted assignments will be accepted. **NO LATE HOMEWORK WILL BE ACCEPTED. NO EXCEPTIONS** (barring emergencies and extreme situations). Group work is encouraged to solve problems. Students are welcome to consult the instructor during office hours or by appointment for additional help with homework. All homework you submit should reflect your own work. Copying of homework is absolutely not acceptable and will result in a grade of ZERO for the assignment.

### Quizzes:

A few quizzes may be given in class during the semester. They will be open-book tests, and calculators will be allowed (if needed). The quiz material given will be similar to the recent homework or topics covered in class. All formulas needed will be provided.

### Exams:

There will be one midterm and one final comprehensive exam. The midterm will test the material covered in the first seven weeks, and the final will include material covered from the beginning of the semester, with more weight on the material covered after the second midterm (weeks 9-15). **NO MAKE-UP QUIZZES OR EXAMS WILL BE GIVEN.** If the student must miss a quiz or an exam, and the student has a legitimate reason, the student must notify the instructor that the exam will be missed prior to the exam. The student must present written verifiable proof of the reason for missing the exam, e.g., a doctor's note, police report, court notice, etc., clearly stating the date AND time of the mitigating problem. If these conditions are met, the score on the comprehensive final exam will be substituted for the quiz or exam the student missed. Otherwise, a ZERO score will be given for the missed quiz or exam. In the event the Final Exam is not taken, under rare circumstances where the student has a legitimate reason for missing the final exam, a make-up exam will be administered.

### Student Code of Conduct:

You are expected to submit work that is your own and properly acknowledge the work of others. You are responsible for understanding and adhering to the Student Code of Conduct that is printed in the UAF Course Catalog. Violations of the Code will be reported to the Dean of Students.

### Disabilities Services:

If applicable, it is your responsibility to arrange for these services. The UAF Center for Health and Counseling provides services for UAF students with disabilities to ensure equal access to educational opportunities. The Center's Disability Services Program ensures compliance with §504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990. If you believe you are eligible for 504 and/or ADA accommodations, please contact them at 474-7043 (WHIT 203).