

Statistical Mechanics

PHY 6536

Class Periods: M,W,F | Period 3 (9:35 AM - 10:25 AM)

Location: NPB 1101

Academic Term: Spring 2020

Instructor:

Yuxuan Wang

Yuxuan.wang@ufl.edu

2116 NPB

Office Hours: T,R | Period 3 (9:35 AM - 10:25 AM)

Teaching Assistants:

Please contact through the Canvas website

- Name of TA, email address, office location, office hours
- Name of TA, email address, office location, office hours

Course Description

In this course we will study “statistical physics.” This subject is a link between the microscopic world of one or two particles and the macroscopic world of Avogadro’s number of little particles, all the same. In the micro-world, energy is conserved; the equations are exact, reversible, and can be solved at any level of detail required. In the macro-world the details are lost in some thermodynamic limit; we work with very general relationships among macroscopic properties of systems. Reversibility is often lost and entirely new laws of physics emerge.

Course Pre-Requisites / Co-Requisites

Undergraduate thermodynamics, Mechanics, Quantum Mechanics

Course Objectives

In this course we will lay the foundation to your future coursework and research, including in condensed matter physics, biophysics, astrophysics, and high-energy physics. To achieve this objective you are expected to get somewhat familiar with the material ahead of each class, and to complete the homework on your own. Most importantly, have fun!

Required Textbooks and Software

- R.K. Pathria, Paul D. Beale Statistical Mechanics, 3rd edition

Recommended Materials

- Landau and Lifshitz, Statistical Physics
- K. Huang, Statistical Mechanics
- David Tong’s online lecture notes

Course Schedule

Weekly HW’s are due on Mondays. Midterm: Friday, February 28. Final: Tuesday, April 28.

Topics covered includes (tentative):

Thermodynamics

Kinetic Theory

Microcanonical Ensemble

Canonical Ensemble

Grand Canonical Ensemble

Quantum Statistical Mechanics

Partition Function

Fermi Gas

Bose Gas
Imperfect Gas
Cluster Expansion
Phase Transitions
Ising Model: Onsager Solution

Evaluation of Grades

Assignment	Percentage of Final Grade
Homework Sets (10)	40%
Midterm Exam	25%
Final Exam	35%
	100%

Grading Policy

The following is given as an example only.

Percent	Grade	Grade Points
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://gatorevals.aa.ufl.edu/>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://gatorevals.aa.ufl.edu/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code.

On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.