

PHY380 STATISTICAL MECHANICS

Instructor: Paul Saulnier. You may call me Paul.

Office: OHS 208 (507) 933-6123

Office Hours: MTWRF 12:30-1:30 p.m. and other times by arrangement.

Text: *Fundamentals of Statistical and Thermal Physics*, by F. Reif.

Recommended Reference: *Mathematical Handbook of Formulas and Tables*, by Murray R. Spiegel, Schaum's Outline Series. You won't find a better one for 3x the cost!

Classes: MWF 10:30-11:20 in OHS 216

Prerequisites: PHY-225, PHY-250, and PHY-300.

Educational Philosophy: You are responsible for learning the material covered in this course. I am here to organize, structure, explain, and present the material and provide examples as well as answer questions. But the only way for you to learn the material in the course is to personally engage with it. Watching me or others work with the material will not do. Learning requires personal engagement and effort.

Classroom Dynamics: I strive to have a relaxed atmosphere in the classroom. I want everyone to feel welcome and to feel comfortable asking questions. The chances are that if you have a certain question that you are not the only one. There is no such thing as a "stupid question". Everything and anything is "easy" if you know how to do it and everything and anything is "hard" if you do not. It is all of us together in this joint learning endeavor. All of us (me included) striving to understand physics! As the course material is sequential, it is important that you understand material topic X before proceeding to topic Y. So, ask questions early and often as necessary.

Department Ethos: As is expected in any course in the physics department, each student is asked to work, along with the instructor and their student peers, to develop a culture of cooperation and inclusion within our department. The physics major can be challenging, and we all need the respect and support of others. While it would be unreasonable to assume that every single person will develop a close working relationship with every other, it is expected that each individual will be supportive of, and a positive influence on, every member of the departmental community that they encounter.

Attendance: Regular class attendance is expected. If you miss a class for any reason you are responsible for the material covered during the class, including any assignments introduced or in-class group work. You are responsible for your education and for meeting course expectations.

Homework: Homework will be assigned approximately every week. Late homework will be accepted at the discretion of the instructor, with the loss of 10% per day of the total score. Homework should be your own work, however, some collaboration is expected.

Makeup: Missed exams may be made up at the discretion of the instructor with prior notification and a valid excuse.

Final Exam: Friday, December 16th at 8 a.m. in OHS 216.

Coverage: We will be covering the following chapters in more or less detail.

Chapter 1 - Introduction to statistical methods

Chapter 2 - Statistical description of systems of particles

Chapter 3 - Statistical thermodynamics

Chapter 6 - Basic methods and results of statistical mechanics

Chapter 7 - Simple applications of statistical mechanics

Chapter 9 - Quantum statistics of ideal gases

Chapter 10 - Systems of interacting particles

Chapter 4 - Macroscopic parameters and their measurement (Less)

Chapter 5 - Simple applications of macroscopic thermodynamics

Chapter 8 - Equilibrium between phases or chemical species

Selected topics from Chapters 11, and 12 as/if time permits

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| <u>Evaluation:</u> | There will be three one-hour exams | 3x20% |
| | One two-hour final exam | 20% |
| | Homework | 20% |

Final course grades will be assigned using the following scale as a guide:

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|--------|----|-------|----|
| 94-100 | A | 74-78 | C+ |
| 90-94 | A- | 70-74 | C |
| 86-90 | B+ | 66-70 | C- |
| 82-86 | B | 62-66 | D+ |
| 78-82 | B- | 58-62 | D |
| | | 0-58 | F |

Please note that these ranges are only guidelines. Final grades will also take into account the instructor's evaluation of the student's attendance, participation, and evidence of improvement or regression.

Instructor's Note: My job in this class is to help you learn Stat. Mech. I take this responsibility seriously and I would ask you to help me do my best. Specifically, I would encourage you to ask questions about the material during class and speak with me outside of class to discuss any course related concerns. Don't wait until the end of the semester to inform me of your concerns - by then it is too late. Your opinion is important to me.

Academic Accommodations:

Gustavus Adolphus College is committed to ensuring equitable and inclusive learning environments for all students. If you have a disability and anticipate or experience barriers to equal access, please speak with the accessibility resources staff about your needs. A disability may include mental health, attentional, learning, chronic health, sensory, physical, and/or short-term conditions. When appropriate, staff will guide students and professors in making accommodations to ensure equal access. Accommodations cannot be made retroactively; therefore, to maximize your academic success at Gustavus, please contact them as early as possible. Accessibility resources staff are located in the Academic Support Center (<https://gustavus.edu/asc/accessibility/>) (x7227). Accessibility Resources Coordinator, Corrie Odland (codland@gustavus.edu), can provide further information.

Academic Honesty: By writing your name on any graded assignment for this class, you are attesting to the fact that it has been completed in accord with the college's academic honor policy. I take this responsibility seriously and I expect that you will also. If you have any doubt about what constitutes appropriate use of someone else's work, please ask.