Physics 4488/6562: Statistical Mechanics

https://sethna.lassp.cornell.edu/teaching/562/

Textbook Suggestions

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Required Text

J. P. Sethna, "Statistical Mechanics: Entropy, Order Parameters, and Complexity", Oxford University Press, Second edition, Oxford University Press. The chapters are almost unchanged from the first edition, but many exercises have been added or modified. Available on the Web, at
https://sethna.lassp.cornell.edu/StatMech/EntropyOrderParametersComplexity20.pdf.

Optional Texts

- P. M. Chaikin and T. C. Lubensky, "Principles of condensed matter physics". More advanced topics, covering much of soft matter physics.
- Mehran Kardar, "Statistical Physics of Particles", and "Statistical Physics of Fields". He also seems to have a course on-line from MIT.
- L. D. Landau and E. M. Lifshitz, "Statistical Physics". This was the text when I took the course. Wonderfully thoughtful, extremely terse, notation and vocabulary quite different from the standards in the West. It expresses Landau's view of the subject in the 1950's.
- Walter Greiner, Ludwig Neise, Horst Stöcker, "Thermodynamics and Statistical Mechanics", translated from German. A wonderful book, perhaps at a slightly lower level than the course (but the advanced parts of our course aren't in any of the texts).
- Frederick Reif, Fundamentals of Statistical and Thermal Physics. The standard undergraduate text.
- Michael Plischke and Birgir Bergersen, "Equilibrium Statistical Physics". This book rapidly gets into topics more appropriate for the second semester statistical physics course. The first sixty pages are good, and we'll touch on several of the more advanced topics.
- David Chandler, "Introduction to Modern Statistical Mechanics". It has a great classical treatment of the fluctuation dissipation theorem in Chapter 8. The quantum versions of the theorem are pretty obscure, and give answers which agree as $\hbar \to 0$
- Julia M. Yeomans, "Statistical Mechanics of Phase Transitions" A short book which summarizes the theory of critical phenomena and introduces the renormalization group (Chapter 12)