

## PHYS 8302: Statistical Physics II

- Instructor: Dr. M. Bachmann  
Room: Physics Bldg. 309  
Phone: 706-542-3013  
Email: [bachmann@smsyslab.org](mailto:bachmann@smsyslab.org)  
Course website: [www.smsyslab.org/teaching.html](http://www.smsyslab.org/teaching.html)
- Topics: The second part of this course starts off with the grand canonical theory and second quantization of fermionic and bosonic many-body quantum systems. Thermodynamic properties of the ideal Fermi and Bose gases, including phenomena such as Bose-Einstein condensation, black-body radiation (photons) and lattice vibrations in solids (phonons), magnetism, and superconductivity, are discussed in detail. Advanced topics in the context of phase transitions contain elements of microscopic and phenomenological quantum-statistical field theories, renormalization-group theory, time-dependent non-equilibrium response theory and computational statistical physics.
- References: The following references can be used as guides, but the course does not follow a single text book.  
Basic theory of quantum gases: *Statistical Mechanics* by F. Schwabl; *A Modern Course in Statistical Physics* by L. E. Reichl; *Fundamentals of Statistical and Thermal Physics* by Frederick Reif,  
Advanced Topics: *Quantum Theory of Many-Particle Systems* by A. L. Fetter and J. D. Walecka; *Methods of Quantum Field Theory in Statistical Physics* by A. A. Abrikosov, L. P. Gorkov, and I. E. Dzyaloshinski; *Quantum and Statistical Field Theory* by M. Le Bellac.
- Class: Tuesday and Thursday, 11:00am–12:15pm, room 254 Physics Bldg.
- Office Hours: You can contact me at any time.
- Exams: Midterm and Final. The midterm exam will be in early March; the final exam at the end of April. In both exams, only own hand-written lecture notes and homework solutions are admitted, but no text books or printed scripts. Excused midterm exam absence causes the grade of the final exam to be substituted for the midterm exam; unexcused absence entails grade F. Missing the final exam without documented reason results in failing the course. If the instructor decides that final exam absence was excusable, an oral make-up exam will be set up.
- Homework: There will be graded assignments on a regular basis (typically bi-weekly) with deadlines. No late homework is accepted. No submission via email.
- Grade: Total Grade = (Homework + Midterm + Final)/3
- Grading: [100,85]: A; (85,82.5]: A<sup>-</sup>; (82.5,80]: B<sup>+</sup>; (80,70]: B; (70,67.5]: B<sup>-</sup>; (67.5,65]: C<sup>+</sup>; (65,55]: C; (55,52.5]: C<sup>-</sup>; (52.5,40]: D; (40,0]: F
- Academic Honesty: All members of the academic community are committed to honesty. The academic honesty policy statement of UGA can be viewed online at [www.uga.edu/honesty](http://www.uga.edu/honesty).