

Professor Lukasz Fidkowski

Office: Physics B 411

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Grading:

homework: 100%

Syllabus:

- Basics of collisions, mean free path, scattering time. Basics of transport, diffusion, viscosity, thermal conductivity
- Kinetic theory, BBGKY hierarchy, Boltzmann equation, Boltzmann H-theorem, Relaxation time approximation, Navier-Stokes equation
- Stochastic processes: Langevin equation, Einstein relation, Fokker-Planck equation
- Linear response: Kramers-Kronig relations, fluctuation-dissipation theorem, Kubo formula
- 2nd order phase transitions and critical phenomena; Renormalization group.

Logistics:

- classroom: PAA 114
- meeting times: Tue and Thu 9:30-10:50
- no exams, 6 homeworks

References

For review of Stat Mech 1:

- David Tong, *Lectures on Statistical Physics*, available for free at <http://www.damtp.cam.ac.uk/user/tong/statphys.html> ([Links to an external site.](#)).

For kinetic theory, stochastic processes, linear response:

- David Tong, *Lectures on Kinetic Theory*, available for free at <http://www.damtp.cam.ac.uk/user/tong/kinetic.html>.

For phase transitions and the renormalization group:

- David Tong, *Lectures on Statistical Field Theory* (mostly chapters 1 and 2), available for free at <https://www.damtp.cam.ac.uk/user/tong/sft.html>

- John Cardy, *Scaling and Renormalization in Statistical Physics*.