

Office: G-10 Allen Hall

Class times: Monday and Wednesday 11:00 AM to 12:15 PM

Office hours: Tuesday and Thursday, 11:00 AM to noon, by appointment: email is the best way to contact me.

Email: snoke@pitt.edu

Phone: 412-624-9007

Grader: Yuze Zhang (email: yuz161@pitt.edu)

Textbook: Snoke, *Solid State Physics*, 2nd edition (Cambridge University Press).

Errata are posted at www.phyast.pitt.edu/~snoke and on the Canvas site.

Other resources:

Many homework problems will use Mathematica. You should get this program and install it on your own computer and learn it. If you prefer, you can use another equivalent program, but solutions will be given in Mathematica code.

This is primarily an online class, although I may meet people individually for office hours.

The Zoom address for the class is: <https://pitt.zoom.us/j/6932782570>

Schedule:

Aug 24, 26	Sections 1.1-1.5 Electron bands, Kronig-Penny model, Bloch theorem
Aug 31, Sept 2	Sections 1.7-1.8, 1.9.1, 1.9.2 Density of states, tight-binding model
Sept 7, 9	Section 1.9.3, 1.9.4 Nearly-free electron model, $k \cdot p$ model
Sept 14, 16	Sections 1.11, 1.12, 1.13 Chemical bonds, surface states, spin-orbit effects in bands
Sept 21, 23	Sections 2.1-1.4, 2.5.1-2.5.3 Carriers in metal and semiconductors, doping
Sept 28, 30	Sections 2.6-2.9 Band bending, transistors, quantum Hall effects
Oct 5, 7	Sections 3.1, 3.3-3.4, 3.6-3.7 Classical anisotropic waves, electro-optics, piezoelectrics
Oct 12, 14	Take-home MIDTERM Sections 4.1-4.7 Second quantization: phonons and photons
Oct 19, 21	Sections 4.9-4.10 Heat capacity, Sommerfeld expansion, thermal motion
Oct 26, 28	Sections 5.1.1, 5.1.4, 5.2.1 Quasiparticle interactions
Nov 2, 4	Sections 5.4, 5.6-5.8 Thermal expansion, heat flow, resistivity, diffusion

Nov 9, 11	Sections 7.1, 7.5.1, 7.5.2, 7.6, 7.8 Elements of light-matter interaction
Nov 16, 18	Sections 11.3, 11.4, 11.7, 11.10.1-11.10.3, 11.11 Elements of superconductivity

Grade distribution:

Homework: 30%

Special topic paper: 15%

Midterm exam: 25%

Final exam: 30%

A special topic paper (~5 pages, 3000 words) will be assigned toward the end of the semester; instructions on this paper will be given at that time. If you have a preferred topic to write about, please clear this with me well in advance.