

# Course outline for Physics 271: Solid State Physics I

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## I. COURSE INFORMATION

**Description:** Fundamental principles of the physics of solids. Topics include periodic structure, lattice waves, electron states, static properties of solids, electron-electron interaction, dynamics of electrons in solids.

**Web:** [nip.upd.edu.ph/sand/physics271](http://nip.upd.edu.ph/sand/physics271).

**References:** Ashcroft and Mermin (AM), Grosso Paravicini (GP), Kittel (QTS), Phillips (PP).

**Prerequisite:** Physics 170, Physics 242/equivalents.

**Credits:** 3.0

## II. CLASS POLICIES

**Attendance:** University rules state that students that accumulate six or more absences may be given a failing grade (5.0) if they do not drop the course.

**Long exams:** There will be three long examinations of equal weights, which constitute 3/4 of the final grade. One make up exam replaces an exam missed due to an excused absence. Further missed exams and unexcused missed exams will be given a grade of zero.

Raw score $x$	Point grade
$90\% \leq x \leq 100\%$	1.00
$85\% \leq x < 90\%$	1.25
$80\% \leq x < 85\%$	1.50
$75\% \leq x < 80\%$	1.75
$70\% \leq x < 75\%$	2.00
$65\% \leq x < 70\%$	2.25
$60\% \leq x < 65\%$	2.50
$55\% \leq x < 60\%$	2.75
$50\% \leq x < 55\%$	3.00
$45\% \leq x < 50\%$	4.00
$x < 45\%$	5.00

**Problem sets:** Problem sets make up the remaining 1/4 of the final grade. Late sets will not be given any credit.

**Academic honesty:** Any form of cheating in examinations or any act of dishonesty in relation to studies, such as plagiarism, shall be subject to disciplinary action.

## III. LECTURE OUTLINE

### A. Electron gases

0. Administrative. Drude model. [AM 1]
1. Sommerfeld model. [AM 2]
2. Crystal lattices. [AM 4]
3. Reciprocal lattice. [AM 5]
4. X-ray diffraction. Crystal Structures [AM 7]
5. Electrons in periodic potentials 1. Bloch theorem. [AM 8]
6. Electrons in periodic potentials 2. 1D potentials and Kronig-Penney model. [AM 8]
7. Electrons in periodic potentials 3. Weak potentials. [AM 9]
8. Tight binding. [AM 10]
9. Semiclassical model. [AM 12-13]
10. Refinements to the Drude model and independent electron approximations. [AM 16-17]
11. Phonons. [AM 21-23, 26]
12. Dielectrics. [AM 27]
13. Semiconductors. [AM 28-29]
14. Diamagnetism and paramagnetism. [AM 31]

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