

SILABUS

FISIKA ZAT PADAT

FISIKA (B,E)

Rita Prasetyowati
Fisika FMIPA UNY

TATAP MUKA	MATERI	SUB MATERI	REFERENSI
14,15	Mendesripsikan kristal semikonduktor	Kristal Semi Konduktor 1. Celah Energi 2. Persamaan Gerak Elektron 3. Lowong 4. Mass efektif 5. Semi Konduktor Intrinsik 6. Semi konduktor ekstrinsik 7. Ionisasi Termal Donor dan Akseptor 8. Efek Termoelektrik 9. Semi logam	
16	UJIAN SISIPAN II		

Referensi/ Sumber Bahan

- Edi Istiyono. 2000. *Fisika Zat Padat I*. Yogyakarta: FMIPA UNY
- Kittel, C. 1996. *Introduction to Solid State Physics*. New York: John Wiley & Son, Inc.
- Chrisman, J. R., 1988, *Fundamentals of Solid State Physics*. New York: John Wiley & Son
- Omar, M. A., 1975, *Elementary Solid State Physics: Principles and Applications*. Manila: Addison-Wesley Publishing

Evaluasi

No	Komponen	Bobot (%)
1	Partisipasi	25%
2	Tugas	25%
3	Ujian Sisipan I	25%
4	Ujian Akhir	25%
	Total	100%

Metode Perkuliahan

- Diskusi kelompok
- Presentasi di depan kelas
- Tanya jawab (diskusi kelas)
- Menulis kesimpulan hasil diskusi (sebagai tugas rutin) → individu

Pembagian kelompok dan topik?

What is solid state physics?

- ▶ Explains the properties of solid materials.
- ▶ Explains the properties of a collection of atomic nuclei and electrons interacting with electrostatic forces.
- ▶ Formulates fundamental laws that govern the behavior of solids.

Aim of Solid State Physics

- Solid state physics (SSP) explains the properties of solid materials as found on earth.
- The properties are expected to follow from Schrödinger's eqn. for a collection of atomic nuclei and electrons interacting with electrostatic forces.
- The fundamental laws governing the behaviour of solids are known and well tested.

What is solid state physics?

- Solid state physics, also known as **condensed matter physics**, is the study of the behaviour of atoms when they are placed in close proximity to one another.
- In fact, condensed matter physics is a much better name, since many of the concepts relevant to solids are also applied to liquids, for example.

What is the point?

- Understanding the electrical properties of solids is right at the heart of modern society and technology.
- The entire **computer and electronics industry** relies on tuning of a special class of material, the **semiconductor**, which lies right at the metal-insulator boundary. Solid state physics provide a background to understand what goes on in semiconductors.

Solid state physics (SSP) is the applied physics

- New technology for the future will inevitably involve **developing and understanding new classes of materials**. By the end of this course we will see why this is a non-trivial task.



- So, **SSP is the applied physics** associated with technology rather than interesting fundamentals.

DESKRIPSI MATA KULIAH

- Matakuliah ini memuat bahasan tentang : Struktur kristal, Difraksi kristal dan kisi resiprok, ikatan kristal, getaran kristal, Sifat termal, Elektron bebas gas Fermi, Pita energi, Kristal semikonduktor

STANDAR KOMPETENSI MATA KULIAH

Mahasiswa memiliki ketrampilan belajar mandiri tentang konsep-konsep dasar dan memahami eksperimen mengenai Kristal, sifat termal, sifat listrik, dan semikonduktor.

RENCANA KEGIATAN

TATAP MUKA	MATERI	SUB MATERI	REFERENSI
1,2	Mendesripsikan Struktur Kristal	Struktur Kristal 1. Sifat Periodik 2. Volume Sel 3. Rapat Kemasan 4. Bilangan Koordinasi 5. Kisi Dua dan Tiga Dimensi Struktur Kristal 1. Indeks Bidang 2. Jarak Antar Bidang 3. Kristal sederhana	

TATAP MUKA	MATERI	SUB MATERI	REFERENSI
3,4	Mendesripsikan Kisi Resiprok	<p>Difraksi Kristal dan Kisi Resiprok :</p> <ol style="list-style-type: none"> 1. Difraksi Gelombang oleh Kristal 2. Amplitudo Gelombang terhambur 3. Kawasan Brillouin <p>Kisi Resiprok :</p> <ol style="list-style-type: none"> 1. Kisi Resiprok 2. Analisis Fourier pada Basis: <ol style="list-style-type: none"> a. Faktor Struktur b. Faktor Bentuk Atomik 	

TATAP MUKA	MATERI	SUB MATERI	REFERENSI
5	Mendesripsikan Ikatan Kristal	Ikatan Kristal <ol style="list-style-type: none"> 1. Gaya Antar Atom 2. Macam-macam -Ikatan Kristal: Ikatan van der Waals, ionik, logam, kovalen, dan hidogen 	
6	Mendesripsikan getaran kristal	Getaran Kristal <ol style="list-style-type: none"> 1. Modus Normal Monoatomik 2. Kecepatan Gelombang elastik 3. Tetapan Gaya 4. Modus Kristal Diatomik 	

TATAP MUKA	MATERI	SUB MATERI	REFERENSI
7	Mendesripsikan karakteristik Fonon	Fonon 1. Momentum fonon 2. Jumlah Rerata Fonon 3. Energi Total Fonon 4. Rapat Fonon	
8	Menyelidi sifat termal	Sifat Termal 1. Kapasitas Kalor: a. Model Debye b. Model Einstein 2. Ekspansi Termal 3. Konduktivitas Termal	

TATAP MUKA	MATERI	SUB MATERI	REFERENSI
9	UJIAN SISIPAN I		
10,11	Mendesripsikan elektron bebas gas fermi	Elektron Bebas Gas Fermi 1. Aras Energi Elektron Bebas 2. Rapat Keadaan elektron 3. Probabilitas Elektron Gas Fermi 4. Kapasitas Kalor Elektron Bebas Gas Fermi 5. Gerak Elektron Dalam Medan Listrik 6. Gerak Elektron Dalam Medan Magnet : <i>Efek Hall dan Aplikasinya</i>	

TATAP MUKA	MATERI	SUB MATERI	REFERENSI
12,13	Mendeskripsikan pita energi	Pita Energi <ol style="list-style-type: none"> 1. Pengantar Pita energi 2. Energi Model Elektron Hampir Bebas 3. Celah energi 4. Persamaan Gelombang Elektron dalam Potensial Periodik 5. Jumlah Orbital dalam Pita 6. Logam dan Isolator 	