

# SEMICONDUCTOR DEVICE THEORY (EEE 461)

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## *Course Instructor*

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Professor  
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## *Course Website*

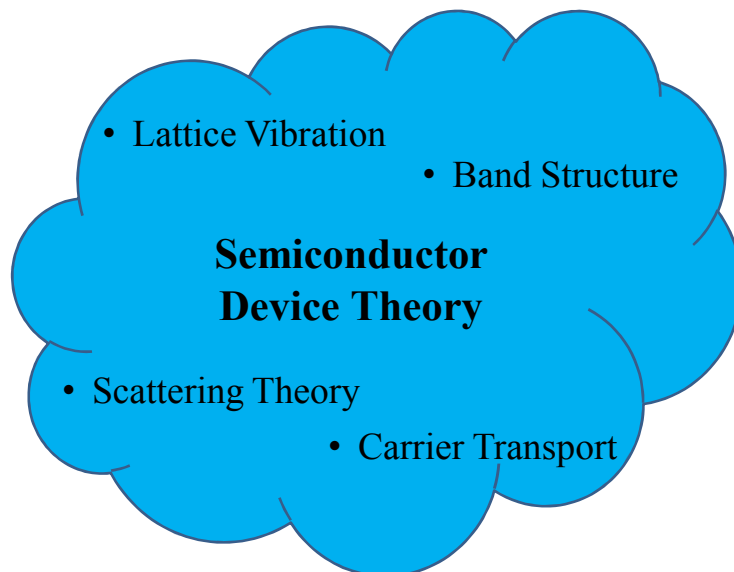
Please check

[https://anis.buet.ac.bd/Semiconductor\\_Device\\_Theory.html/](https://anis.buet.ac.bd/Semiconductor_Device_Theory.html/)

for EEE 461 lecture notes, grades, and updates.

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## *Course Overview*

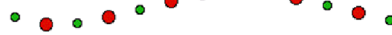
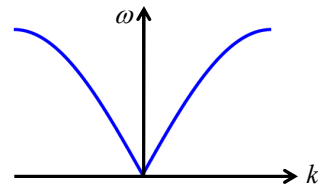
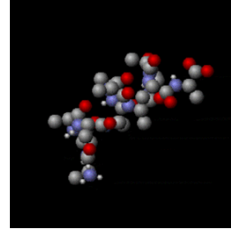


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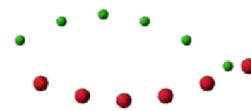
## Overview: Lattice Vibration

### Lattice vibration

- Simple harmonic model
- Dispersion relation
- Phonons



Acoustic mode



Optical mode

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## Overview: Band Structure

### Band Structure

- Electrons in crystals
- Energy bands
- Effective masses



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## *Overview: Scattering Theory*

### **Scattering Theory**

- Perturbation theory
- Fermi-Golden rule
- Different scattering processes

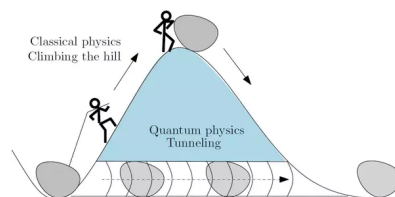


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## *Overview: Carrier Transport*

### **Carrier transport**

- Classical model
- Quantum mechanical model



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## ***Time Line***

- **Lattice vibration** – 3 weeks
- **Band structure** – 3 weeks
- **Scattering theory** – 3 weeks
- **Carrier transport models** – 3 weeks

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## ***Class Tests***

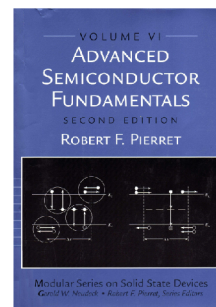
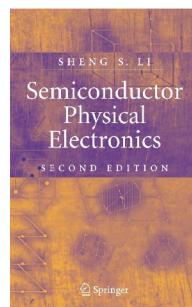
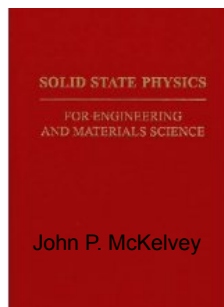
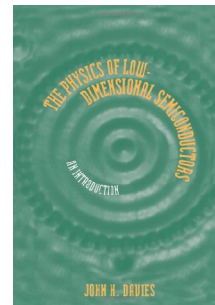
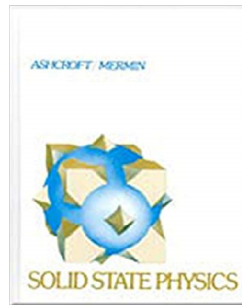
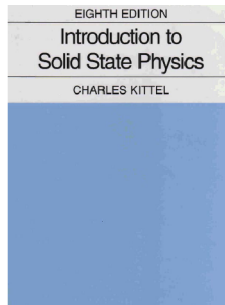
- **Lattice vibration** – 1
- **Band structure** – 1
- **Scattering theory** – 1
- **Carrier transport models** – 1



We may decide in favor of a project/term paper.

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## Books



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## Good News!

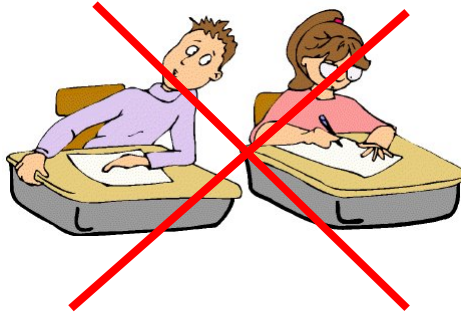
- Materials covered will be helpful for
  - Present and future research
  - Graduate studies



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***Bad News!***

**Be Serious About Class Tests**



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***No Phones, No Laptops in Class***



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## ***First Assignment***

- Email to [anis@eee.buet.ac.bd](mailto:anis@eee.buet.ac.bd) with
  - **Subject:** EEE 461
  - **Body:** “Your Name, Student Number” <email address>
- It will help me to keep you posted on the course updates.