



# **Near-Equilibrium Transport: Fundamentals and Applications: Volume 2 (Lessons from Nanoscience: A Lecture Notes Series)**

*Mark Lundstrom, Changwook Jeong*

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These lectures are designed to introduce students to the fundamentals of carrier transport in nano-devices using a novel, “bottom up approach” that agrees with traditional methods when devices are large, but which also works for nano-devices. The goal is to help students learn how to think about carrier transport at the nanoscale and also how the bottom up approach provides a new perspective to traditional concepts like mobility and drift-diffusion equations. The lectures are designed for engineers and scientists and others who need a working knowledge of near-equilibrium (“low-field” or “linear”) transport. Applications of the theory and measurement considerations are also addressed. The lectures serve as a starting point to an extensive set of instructional materials available online.

## **Contents:**

- Overview
- General Model for Transport
- Resistance: Ballistic to Diffusive
- Thermoelectric Effects: Physical Approach
- Thermoelectric Effects: Mathematics
- An Introduction to Scattering
- Boltzmann Transport Equation
- Near-equilibrium Transport: Measurements
- Phonon Transport
- Graphene: A Case Study

**Readership:** Students and professionals in physics and engineering.

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