

ME 597F
MICRO- AND NANO-SCALE ENERGY TRANSFER PROCESSES
Special Topics in Heat Transfer
Spring 2003

Instructor Timothy S. Fisher
169 ME Building
tsfisher@purdue.edu

Course Description

This course provides a detailed treatment of the transport of energy in natural and fabricated microstructures. The physical nature of energy transport by three carriers--electrons, phonons, and photons--will be explored from first principles, as well as interactions among these carriers. Bulk material properties, such as thermal and electrical conductivity, will be derived from statistical particle transport theories. Following the treatment of fundamental physical principles, the course will focus on engineering applications, including Monte Carlo simulation, heat generation and transport in semiconductor devices, quantum size effects, and direct energy conversion devices. The applications are interdisciplinary in nature and will not presume prior expertise.

Prerequisites

Graduate standing or permission of instructor

Texts

Required: *Fundamentals of Carrier Transport*, 2nd Edition, Cambridge Press, 2000, by M. Lundstrom

Reserve: *Microscale Energy Transport*, Taylor and Francis, 1998
Edited by C.-L. Tien, A. Majumdar, and F.M. Gerner

Introduction to Solid State Physics, Wiley, 1996, by Charles Kittel.

Solid State Physics, Saunders College Publishing, 1976,
by N.W. Ashcroft and N.D. Mermin