

Fall 2009
ME 4301-006 / 5390-002
Microscale Energy Transport
(Tentative Syllabus subject to change)

Instructor	Hyejin Moon, Ph.D. Assistant Professor of Mechanical Engineering E-mail hyejin.moon@uta.edu Phone 817-272-2017
Schedule	Time: TTh 5:00 – 6:20 pm, Room: TBA
Office hours	MW 10:30 – 12:00 pm or by appointment.
Prerequisites	Two of following four undergraduate courses or equivalent: (i) heat transfer, (ii) fluid mechanics, (iii) thermodynamics, (iv) solid state {physics, device, material} or quantum mechanics.
Course Description	This course introduces the fundamentals and applications of micro- and nanoscale thermal sciences. A central theme throughout the course is a parallel theoretical treatment of the transport and conversion of various energy carriers including electrons, phonons, photons, and molecules in different applications including thermal management of electronics, thermoelectric refrigeration and energy harvesting, solar energy utilization, and laser processing of materials. Some fundamental transport issues in microelectromechanical systems (MEMS) and microfluidics will also be discussed if time permits.
Textbook	Gang Chen, “Nanoscale Energy Transport and Conversion” Oxford Press
References	<ul style="list-style-type: none">• Tien, Majumdar, Gerner (editors), “Microscale Energy Transport”, Taylor&Francis• Zhang, “Nano/Microscale Heat Transfer”, McGraw-Hill• Nolas et al., “Thermoelectrics: Basic principles and new materials developments”, Springer• Nelson, “The physics of solar cells”, Imperial College Press• Kovacs, “Micromachines Transducer Source Books”, McGraw Hill
Subjects	<ul style="list-style-type: none">• Microscopic heat carriers• Size effects in transport phenomena• Basic quantum theory and Schroedinger equation• Crystal vibration and phonon• Boltzmann transport equation• Thermal conductivity model• Semiconductor devices and thermal issues• Energy conversion and thermoelectric devices• Liquids and their interfaces• Basics of molecular dynamics• Term project presentations
Attendance, Assignments and Tests	<ul style="list-style-type: none">• Students are expected to attend all class sessions, complete reading assignments, and participate in class discussions. If a student misses a class, it is his/her responsibility to make up the missed class (i.e. get the course notes, assignments, and announcements from other students).

- There will be several homework assignments that are normally due one week after given. Assignment often includes researching and summarizing related publications. Late homework will not be accepted.
- Two tests (one midterm and one final exam) will be given. For exam dates and time, please see lecture schedule page. No make-up exam will be offered. Students must take both exams as scheduled to pass this course.
- The term project includes oral presentation and submission of a term paper. The topic should be chosen by students and informed to the instructor.
- Students are recommended to consult instructor in regular basis regarding their term project progress. With regard to the term project, more detailed instruction will be given during the term.

Grading

Assignments 20%, Midterm Exam 25%, Final Exam 25%, and Term Project 30% (term paper 15% and oral presentation 15%). Letter grades. A (above 90%), B (75 – 90%), C (60 – 75%), D (50 – 60%), and F (below 50%)

Academic Honesty

It is the philosophy of the University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. (Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.2.2).

Students with disability

If you need accommodations in compliance with the ADA, consult with the instructor.