

Course Syllabus in English	
Course Description	Heat and mass transport are the core of many manufacturing processes, including semiconductor device fabrications, catalyst syntheses, and pharmaceutical productions. This course will introduce the fundamentals of heat and mass transport in materials science and chemical engineering as well as the relevant applications.
Course Requirements	The course is the core course of graduate program in chemical engineering.
Course Objectives	<ol style="list-style-type: none"> 1. Mass transport of gases and liquids. 2. Transport of point defects in solids. 3. Diffusion in semiconductor manufacturing. 4. Electron transport in semiconductors. 5. Ion transport in ionic conductors. 6. Diffusion in electrochemical materials. 7. Coupling between heat and mass transport. 8. Thermoelectrics.
Learning Outcomes	<ol style="list-style-type: none"> 1. Understanding the fundamentals of heat and mass transport in gases, liquids, and solids. 2. Understanding the heat and mass transport processes in material and device manufacturing. 3. Using numerical methods to solve complex heat and mass transport problems.
Required Readings	<ol style="list-style-type: none"> 1. Bird, Stewart, and Lightfoot, <i>Transport Phenomena</i>, 2nd edition 2. Kasap, <i>Principles of electronic materials and devices</i>, 3rd edition 3. Sze, <i>Physics of semiconductor devices</i>, 3rd edition 4. Cussler, <i>Diffusion: Mass Transfer in Fluid Systems</i>, 3rd edition 5. Mehrer, <i>Diffusion in solids</i>, 2nd edition 6. Maier, <i>Physical chemistry of ionic materials: ions and electrons in solids</i>, 1st edition
Grading	<p>Midterm (45%) Final (45%) Homework (10%)</p>