HANYANG UNIVERSITY

Hanyang International Winter School

Faculty Information	**Name**	Chung Won Lee				
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	Home University	Hanyang University (ERICA Campus)				
	Department	MAJOR IN SEMICONDUCTOR AND DISPLAY ENGINEERING				
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Course Information	**Class No.**	18551	**Course Code**	MEE4001	**Credits**	3
	Course Name	Heat Transfer				
	Lecture Schedule	Mon-Fri / 13:00~17:30 (4.5 hrs/day, 10 sessions)				
	Course Description	This course introduces the fundamental principles of conduction, convection, and radiation heat transfer. Students will develop the analytical and numerical skills needed to formulate and solve steady-state and transient heat transfer problems, and to apply these principles to the thermal design of engineering systems such as heat exchangers and electronic cooling devices.				
	Course Objective	- Understand the physical laws governing conduction, convection, and radiation heat transfer - Formulate and solve 1-D/2-D steady-state and transient conduction problems - Analyze forced and free convection heat transfer for internal and external flows - Evaluate radiative heat exchange between surfaces using view factors - Design and evaluate heat exchangers using the LMTD and effectiveness-NTU methods				
	Prerequisite	- Thermodynamics I, Calculus II (Fluid Mechanics recommended)				
	Materials/Textbooks	Incropera, F. P., DeWitt, D. P., Bergman, T. L., Lavine, A. S., Fundamentals of Heat and Mass Transfer, 8th Ed., Wiley. Lecture slides and supplementary problem sets provided by the instructor.				
Evaluation	**Attendance**	10	**Quiz**	0		
	Assignment	0	**Mid-term Exam**	45		
	Presentation	0	**Final Exam**	45		
	Group Project	0	**Participation**	0		
	Etc.	**Evaluation Item**		**Ratio**		

			%
			%
Course Outline	A two-week intensive course (10 sessions) covering conduction, convection, radiation, and heat exchanger design, combining lectures, in-class problem solving, and a short design project applying heat transfer principles to a real engineering system.		
Objectives	- Explain the physical mechanisms of conduction, convection, and radiation - Apply governing equations to solve conduction and convection problems - Evaluate thermal systems and heat exchangers using standard design methods		
Daily Lecture Plan	**Day 1**	Course orientation; basic concepts of heat transfer; Fourier's law and thermal properties of matter	
	Day 2	1-D steady-state conduction: plane walls, cylinders, and spheres; thermal resistance networks	
	Day 3	Extended surfaces (fins): fin equation, fin efficiency and effectiveness, fin design	
	Day 4	2-D steady-state conduction; conduction shape factors; introduction to numerical (finite-difference) methods	
	Day 5	Transient conduction: lumped capacitance method, semi-infinite solid and Heisler chart solutions	
	Day 6	Introduction to convection: boundary layer concepts; external flow correlations (flat plate, cylinder, sphere)	
	Day 7	Internal flow convection: laminar/turbulent flow in pipes; forced convection correlations	
	Day 8	Free (natural) convection: boundary layer development and correlations for vertical/horizontal surfaces	
	Day 9	Radiation heat transfer: blackbody radiation, emissivity, view factors, and radiation exchange between surfaces	
	Day 10	Heat exchangers: types and configurations; LMTD and effectiveness-NTU methods; course review and wrap-up	