WASHINGTON STATE UNIVERSITY
VANCOUVER
World Class. Face to Face.

School of Engineering and Computer Science

MECH 404: Heat Transfer

Catalog Data:	**404 Heat Transfer** 3 Course Prerequisite: MATH 220; MATH 315; MECH 301; MECH 303; Certified major in Mechanical Engineering. Fundamentals of conduction, convection, and radiation heat transfer; analytical, numerical, and empirical modeling for solids, liquids, and gases. Typically offered Spring.
Class Schedule:	Three 50-minute lectures per week, for one semester.
Laboratory Schedule:	None
Prerequisites by Course:	MATH 220; MATH 315; MECH 301; MECH 303; certified major in Mechanical Engineering.
Prerequisites by Topic:	1. Good understanding of calculus and the ability to solve simple differential equations. 2. Ability and knowledge in one computer programming language. 3. Proficiency in thermodynamics and knowledge of conservation laws for mass, momentum, and energy. 4. Knowledge of fundamental fluid mechanics for the internal and external fluid flows.
Textbook:	F.P. Incropera and D.P. DeWitt, *Fundamentals of Heat and Mass Transfer*
Course Coordinator:	Dr. Sun Ung Kim
Course Objectives:	The basic objective is to engage the students in formulating and solving problems that arise in conduction, convection, and radiation modes of heat transfer. After successfully completing the course, the student will demonstrate an ability to: 1. Identify important thermal processes and derive expressions based on the first law of thermodynamics and the basic rate equations for conduction, convection, and radiation. 2. Analyze conduction heat transfer using the resistance network analogy. 3. Determine steady-state and transient temperatures in various solid geometries of practical importance. 4. Explain the mechanisms of importance in convective heat transfer and understand the meaning of pertinent dimensionless parameters. 5. Select and apply the appropriate correlation for convective heat transfer process. 6. Analyze radiation exchange within an enclosure and calculate simple view factors. 7. Solve a thermal engineering problem as part of a group-effort class project.
Topics Covered:	1. Conservation of energy 2. Heat conduction 3. Numerical methods for 2-D conduction 4. Forced Convection 5. Natural/Free Convection 6. Radiation Heat Transfer
Lab Experiments and Activities:	None.

Course Outcomes:	Students will be able to:	
	Assessed for Student Outcomes	1.b. Evaluate information to identify heat transfer problems. 1.d. Apply mathematics, scientific and/or engineering principles toward solving heat transfer problems. 4.a. Assess heat transfer solutions in consideration of the economic, environmental, and societal impacts. 7.b. Use credible sources for heat transfer group projects. 7.c. Apply new knowledge in solving heat transfer problems.
	Other	1.a. Demonstrate knowledge of fundamental heat transfer principles. 1.c. Use appropriate heat transfer models to formulate solutions. 2.a. Define a heat transfer problem for thermal systems. 2.b. Apply the engineering design process (such as concept generation, modeling, evaluation, and iteration) to satisfy project requirements for thermal systems. 2.c. Analyze an engineering system within realistic constraints, such as economic, environmental, social, cultural, global, public health, safety, welfare, and other factors appropriate to thermal engineering. 3.a. Produce final project reports for technical audiences using appropriate formats and grammar with discipline-specific conventions including citations. 7.a. Use appropriate resources to acquire new material not taught in class for class projects.
Required or Elective Course:	Required	
Contribution to Professional Component:	Engineering Topics	
Relationship of Course to Program:	Meets: Educational Objectives 1, 2, 3, 4 Student Outcomes 1, 2, 3, 4, 7	
Prepared by:	Dr. Sun Ung Kim	Date: 7/14/2018 DK/SK (1.10.19 mb)
Approved by USC:		