WASHINGTON STATE UNIVERSITY VANCOUVER

World Class. Face to Face.

School of Engineering and Computer Science

Mech 404: Heat Transfer

Catalog Data:	**Mech 404 Heat Transfer**; 3 credits Fundamentals of conduction, convection, and radiation heat transfer; analytical, numerical, and empirical modeling for solids, liquids, and gases.
Class Schedule:	Three 50-minute lectures per week, for one semester.
Laboratory Schedule:	
Prerequisites by Course:	Math 220, Math 315, Mech 301, Mech 303 or c//
Prerequisites by Topic:	1. Good understanding of calculus and 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.
Required Texts:	*Fundamentals of Heat and Mass Transfer*, F.P. Incropera and D.P. DeWitt
Course Coordinator:	Dr. Amir Jokar
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 drive expressions based on the first law of thermodynamics and the basic rate equations for conduction, convection, and radiation. 2. Analyze conduction heat transfer using a 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 the thermal design of a heat exchanger using conventional methods. 7. Analyze radiation exchange within an enclosure and calculate simple view factors. 8. 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 heat convection 5. Natural Free Convection 6. Heat Exchangers 7. Radiant heat transfer
Lab Experiments and Activities:	Some heat transfer experiments are setup during the semester as group or individual.

Course Outcomes:	Students will be able to: A-1. Apply mathematical principles to derive equations for heat transfer problems. A-3. Review the fundamentals of heat transfer modes. A-4. Analyze the heat transfer processes within the engineering systems. A-7. Model the thermal systems based on conduction, convection, and radiation heat transfer. C-1. Investigate the needs to produce problem definition for a thermal engineering system. C-2. Analyze the thermal design of an engineering system to satisfy project requirements for that system. C-3. Solve a thermal engineering problem within realistic constraints in realizing thermal systems. E-1. Classify the heat transfer problems for different modes: conduction, convection and radiation heat transfer. E-3. Use analytical, computational, or experimental analysis to obtain solutions for a specific heat transfer problem. G-1. Provide a comprehensive report for their class project using a professional engineering writing format. H-1. Learn about the impact of engineering solutions in a global context through the study of specific thermal engineering problems. I-1. Use resources other than covered in class in analyzing the design of a thermal engineering system. J-2. Investigate the impact of engineering decisions on energy resources through the study of specific thermal engineering problems. K-3. Write computer programs to find the numerical solutions for a thermal engineering problem in their class project.		
Required or Elective Course:	Required		
Contribution to Professional Component:	Engineering Topics		
Relationship of Course to Program:	Meets: Educational Objectives 1, 2, 3, 4 Program Outcomes A, C, E, G, H, I, J, K		
Prepared by:	Amir Jokar	Date:	November 1, 2006
Approved by CAC:			