University Of California, Berkeley
Department of Mechanical Engineering

ME 252 – Heat Convection (3 units)

Graduate Course

Syllabus

CATALOG DESCRIPTION

The transport of heat in fluids in motion; free and forced convection in laminar and turbulent flow over surfaces and within ducts.

COURSE PREREQUISITES

ME 151, 265A; Engineering 230A

TEXTBOOK(S) AND/OR OTHER REQUIRED MATERIAL

Convective Heat and Mass Transfer, 4th edition, by W.M. Kays, M.E. Crawford and B. Weigand, McGraw Hill, 2005.

COURSE OBJECTIVES

To teach students the physics of convective transport and the effects of fluid properties, including heat convection and mass transfer by convection. Analytical and numerical methods for solution of the governing equations are covered.

DESIRED COURSE OUTCOMES

Students will know and understand the physics of convective transport processes and have a working knowledge of numerical and analytical methods for solving engineering problems in this area.

TOPICS COVERED

1. Conservation equations, solution characteristics
2. Laminar fully developed velocity and temperature fields
3. Laminar thermally developing flows
4. Laminar hydrodynamic boundary layers
5. Laminar thermal boundary layers
6. Laminar thermal boundary layers with viscous dissipation
7. Natural convection
8. Turbulent flows
9. Mass transfer
10. Applications and special topics

CLASS/LABORATORY SCHEDULE

3 hours of lecture per week.

CONTRIBUTION OF THE COURSE TO MEETING THE PROFESSIONAL COMPONENT

Knowledge of this material is critically important to design and development of energy systems.

ASSESSMENT OF STUDENT PROGRESS TOWARD COURSE OBJECTIVES

The course grade will be based on homework assignments (15%), midterms (25% each) and a final project (35%).

PERSON(S) WHO PREPARED THIS DESCRIPTION

Professors Carey and Greif, 10/22/14.

ABBREVIATED TRANSCRIPT TITLE (19 SPACES MAXIMUM):
TIE CODE: [Shareena Enters]
GRADING: Letter and/or Pass Not Pass
SEMESTER OFFERED: Fall and Spring
COURSES THAT WILL RESTRICT CREDIT: None
INSTRUCTORS: Staff
DURATION OF COURSE:
EST. TOTAL NUMBER OF REQUIRED HRS OF STUDENT WORK PER WEEK:
IS COURSE REPEATABLE FOR CREDIT?
CROSSLIST: None