UNIVERSITY OF ARIZONA
DEPARTMENT OF CHEMICAL AND ENVIRONMENTAL ENGINEERING
CHEE 505 - Advanced Transport Phenomena
FALL 20xx

Instructor       Eduardo Sáez, Harshbarger 142C
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                 Office hours: open-door policy or by email appointment

Textbook        Class Notes posted on the course web page (D2L)

Objective

Study of the fundamental principles and governing equations used in the analysis of transport phenomena. The knowledge obtained will be used to formulate and solve transport phenomena problems.

Outline

1. Introduction
   The continuum hypothesis. Vector algebra – index notation. Description of motion in continua –
   kinematics. Dilatation. The transport theorem.

2. Conservation of mass and momentum
   Navier-Stokes equations.

3. Incompressible flows
   Solutions of the Navier-Stokes equations in one-dimensional flows. Fluid mechanics of phase
   Boundary layer theory. Turbulence.

4. Energy transport
   Energy conservation. Viscous dissipation and expansion/compression energy effects. Thermal
   boundary layers. Natural convection.

5. Mass transport
   Mass conservation for a chemical species in a mixture. Diffusion with chemical reaction.
   Concentration boundary layers. Hydrodynamic dispersion.
Selected References


Course Evaluation

*Homeworks*

There will be individual homework assignments approximately every week. The final homework average will correspond to 25% of the final grade.

*Tests*

There will be three tests. Each test will correspond to 25% of the final grade. All tests will be open book and notes. Test dates and times TBD