CHEE 6333: Transport Processes (Fall 2014)

Lecture: 4:00–5:30pm, TTh
Location: D102
Catalog data: Cr. 3 (3-0).
Description: Advanced principles of fluid mechanics, heat and mass transfer with application to problems in research and design. Emphasis on unified view of transport processes in laminar and turbulent flow situations.

Instructor: Dr. Jacinta C. Conrad (jcconrad@uh.edu), S226 Eng. Bldg. 1 (3-3829)
Office hours: M, 9:15am–11:30am, or *by email appointment*

Teaching Assistants:
Michael Byington (mcbyington@uh.edu), S283 Engineering Building 1 (3-7342)
Office hours: T/Th, 10:00am–11:00am
Rahul Pandey (rpandey2@uh.edu), S334A Engineering Building 1 (3-4306)
Office hours: T, 2:00pm–4:00pm

Recitation Session: Friday, 3–5 pm in the Senior Room

Textbook: Bird, Stewart, and Lightfoot, *Transport Phenomena*, 2nd ed, Wiley (2002).
Recommended Reading: Deen, *Analysis of Transport Phenomena*, 2nd ed, Oxford (2012).

Topics:

- Math review (1-2 classes):
  - Vector and tensor notation
  - Vector and tensor calculus
- Momentum transport (10-12 classes):
  - Molecular view of momentum transport
  - Shell balances
  - Equations of continuity, motion
  - Steady-state and time-dependent 1-D flows
  - 2-D flows
  - Boundary layer flows
  - Turbulent flows
  - COMSOL examples
- Heat transport (5-7 classes):
  - Shell balances
  - Equation of energy
  - Steady-state and time-dependent 1-D flows
  - 2-D flows
  - Boundary layer flows
  - Turbulent flows
  - COMSOL examples

- Mass transport (5-7 classes):
  - Shell balances
  - Multicomponent equations of change
  - Steady-state and time-dependent 1-D flows
  - 2-D flows
  - Boundary layer flows
  - Turbulent flows
  - COMSOL examples

Exam 1: Tuesday, October 7, 2014

Exam 2: Thursday, November 6, 2014

Final exam: Tuesday, December 16, 2014, 5–8pm

Evaluation:

- COMSOL Homework: 5%
- Two exams: 25% each, total 50%
- Final exam: 45%

Learning Objectives:

- *Outcome 1*: Students will learn how to translate a physical description of a relevant process into a mathematical model for that process.
- *Outcome 2*: Students will learn how to translate relevant mathematical symbols into physical reality.
- *Outcome 3*: Students will learn how to solve several classic problems in fluid dynamics, heat transport and mass transport.

Exam policies:

- No calculators, cell phones, pagers, laptops, or PDAs.
- No makeup exams will be given.
- All regrade requests **MUST** be put in writing, and submitted at one time no later than one week after exams are returned.
- All questions on an exam submitted for regrading will be regraded.

Special dates:

- September 2, 2014: Last day to add a course.
- September 10, 2014: Last day to drop a course or withdraw without receiving a grade.
- October 31, 2014: Last day to drop a course or withdraw with a "W."
- November 26–29, 2014: Thanksgiving Break

Academic dishonesty:

- Please see section 3.02 for the University of Houston policy on academic dishonesty.
- The instructor takes academic dishonesty very seriously.