

King Fahd University of Petroleum & Minerals
DEPARTMENT OF CHEMICAL ENGINEERING
CHE 501 - Advanced Transport Phenomena
First Semester 2013-2014 (Term 131)

Course Instructor:

Dr. Usamah Al-Mubaiyedh

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Office Hours: UMTWR 11:00 AM to 12:00 NN

Textbook:

Transport Phenomena, by Bird, Stewart and Lightfoot, Wiley International, 2nd Ed. (2007).

Reference Books::

- 1) Viscous Flow, by F. M. White.
- 2) Fluid Dynamics and Heat Transfer, by Knudsen and Katz.
- 3) Momentum, Energy, and Mass Transfer, by J. C. Slattery.
- 4) Convective Heat and Mass Transfer, by Kays and Crawford.
- 5) Boundary Layer Theory, by H. Schlichting, 3rd ed. McGraw-Hill
- 6) Heat and Mass Transfer, by Mills

Course Outcomes:

Upon successful completion of this course, the students will be able to:

Outcome 1: Understand the similarities between the different types of transport phenomena

Outcome 2: Apply knowledge of advanced mathematics, science, and engineering principles in solving chemical engineering problems.

Outcome 3: Apply to formulate transport phenomena problems and set boundary conditions for solving differential equations

Outcome 4: Conduct independent research projects.

Outcome 5: Communicate effectively both orally and in writing.

Course Outline:

Topic	Chapters	Estimated # of Weeks
Introduction to transport phenomena and molecular transport	Chaps. 0, 1, 9, 17 and Appendices A, B & C	Review by Students
Velocity, temperature and concentration distribution in laminar flow	Chaps. 2, 10 and 18	5
Development of mass, momentum and energy conservation equations	Chaps. 3, 11 and 19	5
Velocity, temperature and concentration distributions with more than one independent variable.	Chaps. 4, 12 and 20	5

Grading Policy:

Homework	15%
Term project	15%
Midterm Exam (Late November).....	30%
Final Exam	40%

Suggested Topics for Term Projects:

- Transport phenomena in nanomaterials
- Transport phenomena in plumes
- Transport phenomena in membranes.
- Flow in porous media
- Multiphase flow
- Any other topic (to be discussed with the instructor)

Important Notes:

- Attending classes is very important for understanding the material and passing the course, according to University regulations unexcused absence in 20% of the course lectures (6 unexcused absences) will result in an automatic DN grade.
- Every student must maintain trust and honesty to ensure the integrity of his assignments and exams. Any cheating shall render the student to be subjected to punishment in accordance with KFUPM's disciplinary rules.