CHEMICAL & BIOLOGICAL ENGINEERING 521
ADVANCED TRANSPORT PHENOMENA I
FALL 2015

Instructor: Dr. Kristianto Tjiptowidjojo and Prof. Dimiter N. Petsev
Office Hours: TBD

Email: Tjiptowi@unm.edu and dimiter@unm.edu (D.N.P.)

Class: TR 2:00-3:15 pm

Teaching Assistant/Grader:
TBD

Course Description:
Students will build on undergraduate-level understanding of momentum, heat, and mass transfer. Transport equations will be discussed and applied to various fluid systems. Topics covered will include
S.E.H.: equations of change, dimensional analysis, boundary layer theory, potential flow. (16 lectures, Aug. 8 – Oct. 8)
D.N.P.: mass transfer, electrokinetics, and colloids (15 lectures, Oct. 13 – Dec. 10).

Course Prerequisite: Math 316 or equivalent

Textbook: R. Byron Bird, Warren E. Stewart, and Edwin N. Lightfoot, *Transport Phenomena*, Revised 2nd Ed. (John Wiley & Sons, Inc., 2007) ISBN 978-0-470-11539-8

Grading: The course grades will be based on problem sets and examinations. The breakdown is

Attendance:	10 %
Homework:	30 %
Two Take-home Exams:	30 % for each

Homework problem sets must be submitted in class before class starts on the required due date. Late homeworks will receive zero credit, although they will be graded as a feedback to the students. Group collaboration is strongly encouraged for homework. However, no discussion will be allowed for exams with anyone except with the instructors.

Academic Integrity

You are expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, including dismissal, against any student who is found responsible for academic dishonesty or who otherwise fails to meet the standards. Any student who has been judged to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course.

Academic dishonesty includes, but is not limited to, dishonesty in exams or homework assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or outside the university; and nondisclosure or misrepresentation in filling out applications or other university records.

Special Needs and Assistance: If you are a qualified person with disabilities who might need appropriate academic adjustments, please communicate with the instructor as soon as possible, so that we may make appropriate arrangements to meet your needs in a timely manner. Frequently, we will need to coordinate accommodating activities with other offices on campus.

Course Outline:

Topics	Chapter	Approx. # of Lectures
Review of vectors and tensors.	Appendix A	1
Equations of change, boundary conditions, and constitutive equations.	1, 9, 17	1
Applications of equations of change to various systems (momentum and heat transport).	2, 3, 10, 11	6
Dimensional analysis	3, 11	2
Boundary layer theory and lubrication flow	4, 12	6
Electrokinetic phenomena	Handouts	2

Equations of change for multi-component systems: multi-component diffusion, etc.	18	3
Concentration distribution with more than one independent variable: unsteady diffusion, simultaneous momentum and heat transfer, etc.	19	3
Particle dynamics and dynamics light scattering	Notes	3

Tentative Schedule for Homeworks and (take-home) Exams

HW1: applications of equations of change (due 9/10)

HW2: dimensional analysis, boundary layer (due 9/6)

Exam1: applications of equations of change, dimensional analysis, boundary layer, potential flow (due 10/13)

HW3:

HW4:

Exam2: mass transfer, …

Classes will not be held on Nov 10, 12 (AIChE meeting) and Nov 26 (Thankgiving).