Transport Phenomena I

The University of Toledo
College of Engineering
CHEE 6550/8550

Instructor: Matthew Liberatore
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Class Location: Palmer Hall (PL) 3110
Class Day/Time: TR 4:10pm to 5:25pm
Credit Hours: 3 hours
Office Hours: TBA and by appointment.

COURSE/CATALOG DESCRIPTION

The course will focus on formulating and solving engineering problems involving momentum transfer from the microscopic view. The topics included will include developing momentum balances for fluids in laminar flow; developing and applying equations of change; boundary layers in turbulent Newtonian flow; vector/tensor analysis; approximation methods; computational solutions; and non-Newtonian fluid phenomena.

STUDENT LEARNING OUTCOMES

1. Understand theoretical and practical aspects of momentum transport and fluid flow.
2. Ability to mathematically formulate and solve complex problems related to fluid flow as encountered during chemical engineering practice.

PREREQUISITES AND COREQUISITES

None.

REQUIRED TEXTS AND ANCILLARY MATERIALS

Transport Phenomena, 2005, Second Edition. R. Byron Bird, Warren E. Stewart, Edwin N. Lightfoot, John Wiley and Sons, Hoboken, New Jersey

UNIVERSITY POLICIES

The University is an equal opportunity educational institution. Please read The University's Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance.

Academic Accommodations

The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the Student Disability Services Office.

GRADING

Homework and Projects (individual and group)	30%
Exam (in October)	30%
Final Exam (in December)	40%

COURSE SCHEDULE

The schedule given below is a guide and will change without notice.

Week	Topic	Textbook Chapter/Section
1	Introduction to course	1
2	Shell momentum balance and boundary conditions; flow of a falling film;	2.1 and 2.2
3	Flow through a circular tube and an annulus;	2.3 and 2.4
4	Flow of two adjacent immiscible fluids; flow around a sphere	2.5 and 2.6
5	Equations of change	3.1-3.5
6	Applications of equations of change to solve flow problems	3.6 and 3.7
7	Time dependent flow of Newtonian fluids	4.1
8	**Exam**	
9	Velocity distributions in turbulent flows	5.1 and 5.2
10	Velocity distributions in turbulent flows	5.3, 5.4 and 5.5
11	Interphase transport in isothermal systems	6.1, 6.2, 6.3 and 6.4
12	Macroscopic balances for isothermal flow	7.1, 7.2, 7.3 and 7.5
13	Solving problems by macroscopic balance	7.6
14	Polymeric fluids and rheometry	8.1 and 8.2
15	Non Newtonian Systems	8.3
TBA	**Final exam**	