

CM5300**Advanced Transport Phenomena**
Course No. 10842**Sp 2008**

Course Objectives:

- Objective 1: To develop and detailed understanding of the physics behind transport phenomena in chemical and biological engineered systems.
- Objective 2: To learn solution techniques in advanced transport phenomena.

Instructor: Professor David R. Shonnard (202I, CSEB)
Chemical Engineering Department
Phone: 487-3468 (Office)
email: drshonna@mtu.edu
office hours: M,W 4 – 5 pm.

Time: MWF 1105 - 1155 (11:05 am - 11:55 am)

Location: Room 104A, Chemical Sciences and Engineering Building

Text: Required: Bird • Steward • Lightfoot, Transport Phenomena, 2nd Edition, Wiley, 2007.

Web site: <http://www.chem.mtu.edu/~drshonna/cm5300/index.html>

Course Outline

Part I. Advanced Momentum Transport	(portions of Chapters 1-7)	week 1-5
A.	Chapter 1. Review of Viscosity and Momentum Transport	week 1
B.	Chapter 2. Advanced Shell Balances/Laminar Flow	week 2
C.	Chapter 3. Equations of Change/Isothermal Systems	week 3
D.	Chapter 4. Velocity Distributions in More than One Variable	week 4
E.	Select Topics - Review for Exam	week 5
Part II. Advanced Energy Transport	(portions of Chapters 9-16)	week 6-10
A.	Chapter 9. Review of Thermal Conductivity / Energy Transport	week 6
B.	Chapter 10. Advanced Shell Balances in Solids/Laminar Flow	week 7
C.	Chapter 11. Equations of Change/Nonisothermal Systems	week 8
D.	Chapter 12. Temperature Distributions in More than One Variable	week 9
E.	Select Topics - Review for Exam	week 10

Part III. Advanced Mass Transport	(portions of Chapters 1-7)	week 11-14
A.	Chapter 17. Review of Diffusivity and Mass Transport	week 11
B.	Chapter 18. Concentration Distributions in Solids/Laminar Flow	week 12
C.	Chapter 19. Equations of Change Multicomponent Systems	week 13
D.	Chapter 20. Concentration Distributions > One Variable	week 14

Course Policies and Procedures

Homework

Homework will be assigned weekly at the discretion of the instructor. One week will be allowed for each assignment. Homeworks will be graded, and, examinations may be based on homework materials in addition to the lecture and required text. 20% of the course grade is homework.

Examinations

There will be three exams. All examinations will be open-book and will have equal weight in calculating the final grade for the course (20% of the final grade for each examination). Make-up exams will be given only for valid written excuses prior to the exam, subject to the arbitrary judgment of the instructor.

Term Computer Project

One term project will be assigned near the middle of the semester. You will be asked to choose an advanced topic in transport phenomena to analyze. You will use the commercial software package (COMSOL Multiphysics 3.2). The report for the term project will comprise 20% of the course grade. More details will be provided later.

Course Grade Policy

The weighting of the examinations and report will be as follows

Mid-term I	(mid February)	20%	100 pts
Mid-term II	(early April)	20%	100 pts
Mid-term III	(early May)	20%	100 pts
Term Project Report	(due end of semester)	20%	100 pts
Homework (Collectively)		20%	100 pts
		Total	500 pts

Letter Grades will be assigned following this schedule

90-100%	A	70-75%	C
85-90%	AB	65-70%	CD
80-85%	B	60-65%	D
75-80%	BC	<60%	F