CM5300 Advanced Transport Phenomena Sp 2008
Course No. 10842

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 (2021, 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
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 that 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 that One Variable week 9
E. Select Topics - Review for Exam week 10
Part III. Advanced Mass Transport  
(portions of Chapters 1-7)  
A. Chapter 17. Review of Diffusivity and Mass Transport  week 11 
B. Chapter 18. Concentration Distributions in Solids/Laminar Flow  week 12 
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

<table>
<thead>
<tr>
<th>Exam Type</th>
<th>Percentage</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Mid-term I (mid February)</td>
<td>20%</td>
<td>100 pts</td>
</tr>
<tr>
<td>Mid-term II (early April)</td>
<td>20%</td>
<td>100 pts</td>
</tr>
<tr>
<td>Mid-term III (early May)</td>
<td>20%</td>
<td>100 pts</td>
</tr>
<tr>
<td>Term Project Report (due end of semester)</td>
<td>20%</td>
<td>100 pts</td>
</tr>
<tr>
<td>Homework (Collectively)</td>
<td>20%</td>
<td>100 pts</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>500 pts</strong></td>
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Letter Grades will be assigned following this schedule
- 90-100% A  
- 85-90% AB  
- 80-85% B  
- 75-80% BC  
- 70-75% C  
- 65-70% CD  
- 60-65% D  
- <60% F