

Kettering University  
Department of Chemical Engineering  
**CHME 420 Sec. 1 MR 1:20 - 3:25 PM, Room: AB 2-232**  
Applied Transport Phenomena

**Instructor:** Salomon Turgman Cohen, **Office:** AB2224B

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**Office Hours:** Tuesday 9-11am or by appointment.

**Textbook:** Bird, R.B., Stewart, W.E., and Lightfoot, E.N., Transport Phenomena. 2nd Edition. Wiley (2007). ISBN 978-0-470-11539-8

**Prerequisites:** CHME300, MATH204, Corequisite: CHME421

**Course Purpose:** To understand the fundamental physical phenomena that give rise to momentum, energy, and mass transport in Chemical Engineering. To develop a physical intuition and to sharpen the ability to use mathematical models to describe transport processes.

**Course Objectives:** At the end of the course, you will be able to:

- Explain and have a intuitive physical understanding of the molecular stress tensor, heat flux vector, mass flux vector, viscosity, thermal conductivity, and binary diffusivity.
- Develop shell balances to model problems in momentum, energy, and mass transport.
- Apply shell balances to derive general microscopic conservation equations of momentum, energy, and mass transport.
- Use approximations to simplify and solve the conservation equations and obtain relevant profiles and fluxes.
- Leverage mathematical models in designing new processes or transport systems.
- Read critically the transport phenomena research literature.
- Summarize the topic, methods, accomplishments, and limitations of a scientific paper.

**Ethics in the University and Academic Integrity:** Kettering University values academic honesty and integrity. Cheating, collusion, misconduct, fabrication, and plagiarism are serious offenses. Each student has a responsibility to understand, accept, and comply with the University's standards of academic conduct as set forth in our statement, "Ethics in the University," and "Academic Integrity" as well as policies established by individual professors. For more information, refer to the Student Life section of the current Undergraduate Catalog. Undergraduate catalogs are located at <http://www.kettering.edu/undergraduate>. This information is also noted in the Student Handbook.

**Homework:** Is due at the beginning of class on the due date. You are encouraged to collaborate on the homework, but you are responsible for understanding how the solution is achieved and for being able to reproduce the solution in similar situations. Some exam questions are similar to the homework. Not all homework and/or homework problems will be graded, but they will all be checked. Homework should be submitted individually.

**Homework Format:** Use one side of each page, begin each problem in a new page, and box the final answer(s). Staple the pages before handing them in. Make sure to write your name, the due date, and the assignment number on your submission.

**Late Homework:** Homework is due at the beginning of class on its due date. Late assignments will receive a maximum grade of 70% and will be accepted up to the end of the day on the due date. A maximum of two assignments may be late. Further late assignments will not be accepted.

**Posted Solutions:** Problem set solutions will not be supplied but the answers are often available on the problem statement or upon request. It is the student's responsibility to learn to solve the problems by asking in or out of class.

**Exams:** There will be three, one or two hour, exams during the term. The tests may be closed book/notes or open book/notes at the discretion of the professor and depending on the goals of the particular examination.

**Grading:** If you believe an error has been made in grading and believe you should have gotten more points than you got for any reason other than simple addition, write a letter stating your case and bring to the instructor. You have one week from the time the assignment/test is returned to submit your claim for re-grade.

**Literature project:** You will be required to perform a literature search to find and analyze a recent paper from the transport phenomena literature. The journal article must be selected in agreement with the instructor by Week 7 of the term. The paper will be due the last week of the term. Details forthcoming.

**Design project:** You will be required to complete a design project. The design project will be available mid-term and will be due the last week of the term. Details forthcoming.

**Attendance Policy:** Students who miss class due to an excused absence can work with the instructor to make up any missed work. A cold is not an excused absence. Quizzes and in-class exercises can seldom be made up.

**Course Grade:** The weighted average course grade consists of several components:

- 3 Tests (Lowest grade counts 1/2 of the others) ..... 35%
- Homework ..... 20%
- Literature project ..... 15%
- Design project ..... 15%
- Quizzes, in-class exercises, participation ..... 15%

The grade for the course will be assigned as follows:

	$100\% \geq A \geq 90\%$	$90\% > A- \geq 87\%$
$87\% > B+ \geq 83\%$	$83\% > B \geq 80\%$	$80\% > B- \geq 77\%$
$77\% > C+ \geq 73\%$	$73\% > C \geq 70\%$	$70\% > C- \geq 67\%$
$67\% > D+ \geq 63\%$	$63\% > D \geq 60\%$	$60\% > F$

**You must maintain an average grade of 60% in the exams to pass the course. Anything lower in the exams will result on an F grade.**

**Students with Documented Disabilities:** The University will make reasonable accommodations for persons with documented disabilities. Students need to register with the Wellness Center every term they are enrolled in classes. To be assured of having services when they are needed, students should contact the Wellness Center during the first week of each term. Note that it is the student's responsibility to arrange accommodations with each professor. For more information on "Disability Services" refer to the Student Life section of the current Undergraduate Catalog. Undergraduate catalogs are located at <http://www.kettering.edu/undergraduate>. This information is also noted in the Student Handbook.

### Tentative Course Calendar:

MONDAY	THURSDAY
<div style="border: 1px solid black; display: inline-block; padding: 2px;">Jan 11th</div> <b>1</b>	14th <b>2</b> Ch0; §1.1-2,7; §9.1,7-8; §17.1,7-8
18th Dr. Martin Luther King Jr. Day	21st <b>3</b> §1.3-4; §9.2-3; §17.2-3
25th <b>4</b> HW1	28th <b>5</b> Test I
<div style="border: 1px solid black; display: inline-block; padding: 2px;">Feb 1st</div> <b>6</b>	4th <b>7</b>
8th <b>8</b> HW2	11th <b>9</b>
15th <b>10</b>	18th <b>11</b>
22nd <b>12</b> Test II HW3	25th <b>13</b>
29th <b>14</b>	<div style="border: 1px solid black; display: inline-block; padding: 2px;">Mar 3rd</div> <b>15</b>
7th <b>16</b> HW4	10th <b>17</b>
14th <b>18</b>	17th <b>19</b> Test III
21st <b>20</b> HW5	24th Final Exam Week