

MSE 3210 - FUNDAMENTALS OF TRANSPORT PHENOMENA
FALL SEMESTER 2025

Instructor: Josh Kacher
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Office hours: Monday 10-11 am, Tuesdays 1:30-2:30 pm
Or email and set up a time

Teaching Assistants:

Prerequisites: MATH 2401 or MATH 2411 and MATH 2403 or MATH 2413 and
MSE 3001 w/concurrency

Textbook: Theodore Bergman, Adrienne Lavine, Frank Incropera and David DeWitt Fundamentals of Heat and Mass Transfer, Seventh edition, John Wiley & Sons, 2011. ISBN 13 978-0470-50197-9 **(Book is required, can be a different edition)**

Grading: Grades will be based off of exams, homework, and your final project

Homework	- 100 points
Exam #1	- 100 points
Exam #2	- 100 points
Final project	- 100 points
Final Exam	- 200 points

Grading Scheme (grading will be no tougher than this):

A 90-100 B 80- 89.9 C 70-79.9 D 60-69.9

Topics Covered:

1. Basic Principles of Heat Transfer
2. Steady State Conduction
3. Transient Conduction
4. Convection
5. Heat Exchangers
6. Basic Principles of Diffusion Mass Transfer
7. Steady State Mass Transfer
8. Transient Mass Transfer

Course Outcomes:

Outcome 1: The student will demonstrate an understanding of the basic heat transfer mechanisms through solving practical heat transfer problems.

Outcome 2: The student will demonstrate an ability to solve transient heat transfer problems with convective boundary conditions using lumped capacitance, analytical and exact solution, and semi-infinite solid methods.

Outcome 3: The student will demonstrate an ability to determine heat and mass transfer convective heat transfer coefficients and solve basic convection heat and mass transfer problems.

Outcome 4: The student will demonstrate an understanding of basic diffusional mass transfer through solving practical basic mass transfer problems.

Outcome 5: The student will demonstrate an ability to solve transient mass transfer problems with convective boundary conditions using lumped capacitance, analytical and exact solution, and semi-infinite solid methods.

School of Material Science and Engineering Student Outcomes:

- (1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- (2) An ability to apply engineering design to produce solutions that meet specified needs with consideration for public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- (3) An ability to communicate effectively with a range of audiences.
- (4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

(5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

(6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

(7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Missed Tests:

Unexcused – A grade of zero will be given for all unexcused missed tests.

Excused – Student must contact instructor ***before*** a test is missed. Exceptions may be made in special circumstances.

Canvas:

Canvas will be used in this class for providing you course information (see Resources). Homework will be assigned in class and posted on Canvas.

Homework:

Homework will be assigned weekly and due at the end of the due date through Canvas. Homework can be done in groups but each student must submit their own work. Unexcused late submissions will be assessed a 1 point per day penalty

Tests and Exams:

All tests and exams will be closed book and notes, but some equations and tables will be provided as needed. However, **basic equations will not be provided**. This will be clarified as material is covered.

Final Project:

All students, working independently, will be required to make a 5 minute video demonstrating a principle of transport phenomena. The project must include supporting calculations. Examples projects could include calculating the thermal conductivity of materials around the house or demonstrating laminar to turbulent flow. Be creative! All videos will be posted and available for the class to view.

Project plans will be submitted prior to the projects being due using a template provided close to the due date.

Academic Honor Code:

Compliance with Georgia Tech's Academic Honor Code is required.

Please read and understand this document (if you have not already done so). Per the Georgia Tech Honor Code Website <http://honor.gatech.edu/content/2/the-honor-code>

Plagiarizing is defined by Webster's as "to steal and pass off (the ideas or words of another) as one's own: use (another's production) without crediting the source." If caught plagiarizing, you will be dealt with according to the GT Academic Honor Code.

If you need help in the course, you can

- See instructor during normal office time or request an appointment (by EMAIL only, please, to avoid misunderstandings!)
- Make an appointment with the TA (Confirm by Email).
- Get tutoring from one or more of the many avenues on campus:

• Student Success Center <http://success.gatech.edu/> ([Links to an external site.](#)) and <http://success.gatech.edu/tutoring> ([Links to an external site.](#)). The courses supported are listed at <http://success.gatech.edu/tutoring/1-to-1/courses-supported> ([Links to an external site.](#)) - they are not there yet, but there is a promise that they will be there soon. Also,

- OMED (<http://omed.gatech.edu/redux/> ([Links to an external site.](#)) and omed.gatech.edu/tutoring ([Links to an external site.](#)))