Mechanical Engineering
New Jersey Institute of Technology

Course Syllabus and Guidelines

When remote class is enforced, use zoom:

https://njit-edu.zoom.us/my/smarras?pwd=czRXNEJXU0JYNXcyazhjeE9hcUxsZz09

ME407: Heat transfer, section 001

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Office: MEC 315 Fall 2024

(Updated: September 9, 2024)

It is the responsibility of the student to read and understand this course syllabus.

Class Times

M-R 01:00-02:20pm - FMH 203

Office Hours

By appointment only. Send an email with the subject: "**Office hour**".

Prerequisites

Math 222: (Partial) Differential equations or equivalent
ME 304: Fluid mechanics or equivalent
ME 311: Thermodynamics I or equivalent

Main topics

Introduction to the basic principles of thermal energy transfer and transport. The course will cover the fundamental principles of conduction, free and forced convection, and radiation. The problems will cover fundamental engineering applications.

Course outcome

You will learn how to address a problem involving the transfer of heat across bodies of homogeneous material properties (conduction), between bodies in contact with each other but of different material properties (conduction and convection), and between bodies that are not in contact (radiation). The course is taught at a senior undergraduate level and extra credits will be given to **honors students** by means of extra problems.

The understanding of the concept of partial derivatives and differentials is expected because of the large amount of equations that will be either derived or provided during the course of the semester.

Suggested literature

Theory This class will mostly follow

"Heat and mass transfer: fundamentals and applications, Ed. 6" by Yunus A. Cengel and Afshin J. Ghajar. McGraw Hill.

Practice problems Practice problems will be assigned from the textbook or will be given in class.

Knowledge expectations

In addition to a sound knowledge and understanding of the material taught in the pre-requisites, to be proficient in this class the student is expected to have a solid background and sound understanding of calculus and vector calculus. If you are lacking in any of these subjects, please, review them thoroughly as most of the course will be based on concepts from both subjects

Generative AI

Students are allowed to use generative AI tools to create reports. Notice that using AI does now guarantee the correctness of the answer.

Repeating Students

Students repeating the course are required to repeat the entire course. Assignments and reports cannot be transferred from previous semesters.

Table 1: Draft schedule. This may slightly change depending on the general pace of the class.

Week	Content	Notes
1	Heat transfer course introduction, syllabus. Ch1: Intro to HTR (conduction, convection, radiation) (Thermodynamics)	done
2	Ch1: continuation from week 1 Ch2: Heat conduction equation.	done
3	Ch2: problems solve. Ch2/Ch3: steady state conduction	
4	Ch3: steady heat conduction + probs.	
5	Ch4: transient heat conduction + probs.	
6	Ch6: Fundamentals of convection	
7	1st partial exam on Tuesday of week 7. Ch7: external forced convection + probs	
8	Ch7: external forced convection + probs	
9	Ch8: Internal forced convection + probs	
10	Ch9: Natural convection	
11	2nd partial exam on Tuesday of week 11. Ch11: heat exchangers	
12	Ch11: Heat exchangers contin. + problems	
13	Ch12: Fundamentals of thermal radiation	
14	Ch13. Radiation heat transfer	
15	Reading day1	
	Final	

Grading

The grade for this class will be determined according to the following percentages:

Quizzes: 10%. The weight is calculated on the average of all quizzes.
Two partials: 30% each
Project (a list will be provided sometime in the middle of the semester): 20%
Final: 10%

No-show on a quiz or partial counts 0 points and there will be no re-take option. The final is mandatory unless the weighted grade from a quizzes+partial+project $\geq 60\%$ ($\geq D$ grade).

Project Sometime during the semester I will provide a set of projects to choose from. The project will only be mandatory for the honors students. However, regular students can work on it as well for extra credits. The project will be either personal of for teams of up to 2 students.

NO MAKE-UP tests allowed. NO PERSONALIZED TESTS.

	A	Superior: **only given if all of the exams average to an A** (95-100).
	B+	Excellent (85-94)
	B	Very Good (75-84)
Grade scale	C+	Good (70-74)
	C	Acceptable (65-69)
	D	Minimum required to pass (60-64).
	F	Inadequate

The following conditions will cause **loss of points** during any exams:

- Wrong units.
- Wrong numerical results.
- Lack of explicit formula and solution procedure (i.e. I will not give credits/points if you do not show what formula you are using.
- Ambiguous sentences and explanations.

Allowed and not allowed material during testing:

One US-letter sheet of paper written on one side only and containing only the formulas that you think are necessary to solve the problems. Programmable calculators are NOT allowed.
Cellular phones, computers of any type, tablet, etc. are NOT allowed during exams and class.

Personal matters and health issues

The instructor should not be exposed to family matters, health, hospitalization, or other serious personal matters. Should a serious event happen, please, communicate the issue directly and solely to the Dean of Students who will advise on how to proceed.

NJIT honor code

The NJIT honor code will be upheld and any violations will be brought to the attention of the dean of students. *Mobile phones and similar electronic devices are expected to remain silent and not in use — the sight of a mobile phone during an exam will result in a final grade of F for the class.*

Communication

This course will make use of Canvas and/or official NJIT e-mail for dissemination of various materials. You will be regularly contacted via email at your NJIT email address.
I will respond to questions sent by e-mail **if and only if** the answer cannot be found on this syllabus.
I do **not** communicate by telephone.

Problem Sets

Homework will be often assigned but will not be graded. It is the student's responsibility to come see me during office hours if having trouble with the solution of homework problems.
Office hours are not to have the instructor do your homework. **Do not** request *office hours* if you have not first studied the lecture notes covering the material for which you have a question. If you come requiring help, it is your responsibility to have solved the problem by yourself first because I will not solve it for you at office hours; I will explain how to do it to get you going.

Requirements for students

For best understanding of the material, the student is advised to attend all classes. As soon as possible after missing a lecture, it is the responsibility of the student to study the missed material from the book(s) or from the notes of a fellow student.

A personalized exam will **NOT** be granted at a different date unless the request comes directly from the Dean of Students.

Reports placed under doorways and not submitted during the class period are not the responsibility of the instructor if lost.
If you feel you are not going to pass this course, please reach out to your instructor with adequate time before the drop date.

FAQs

1. "I know your policy is that's 95 is an A but I ended the class with a 90 and I feel like I put in a lot of effort to get a 90 in the class. I think a 90 shows enough understanding for an A in the course. Could you curve my grade up to an A?" **NO**

2. In the exam I blanked out but I actually studied a lot for this class and really know it.

   - Can I still get at least a D or higher? **NO**.
   - Can I retake the exam privately? **NO**.

3. If I take the final, will my grade be the average of the final and of the mid-term? **Yes**.

4. "I got an F in the [final] exam because I was in and out of the bathroom. Is there any way I can fix this I really was not focused during the exam". **NO**.

5. "Is there anything I can do to pass this class?" **Yes, study.**

6. I study very hard but I just don't understand what the class is about. Can I still pass this class? **See previous answer.**