










HEAT TRANSFER

ME 603




Instructor Info —

-  Prof. Nathan Laxague
-  MWF 10:00 am - 11:00 am
-  Chase 121D
-  <https://www.nathanlaxague.com>
-  Nathan.Laxague@unh.edu

Lecture Info —

-  Prereq: MATH 527 & ME 608
-  Monday, Wednesday, & Friday
-  9:10 am - 10:00 am
-  Remote via Zoom

Recitation Info —

-  Tuesday
-  11:10 am - 12:30 pm
-  Remote via Zoom

TA Info —

-  Sarah Blagdon
-  MWF: 1:00 pm - 2:00 pm
-  sjb11@wildcats.unh.edu
-  Remil Mushthaq
-  MWF: 1:00 pm - 2:00 pm
-  pr1060@wildcats.unh.edu

Overview

ME 603 is an undergraduate-level course in heat transfer. At the completion of this course, the student should be able to:

- Describe the principles of conductive, convective, and radiative heat transfer
- Apply these principles to basic heat transfer problems
- Analyze heat transfer problems using scientific computing

Material

Required Text

Bergman, Lavine, Incropera and DeWitt *Introduction to Heat Transfer*, 8th Ed., John Wiley and Sons, 2017, ISBN 978-1119444220.

Previous versions of this text are also acceptable. Please note, there is an electronic version of this text for a lower cost.

Other

Any other required reading materials will be provided through Canvas.

Remote Lecture/Recitation Delivery

During lecture and recitation, students will be expected to keep their cameras on and their audio muted. If a student has a question, they may temporarily unmute themselves and speak up. I will not monitor the Zoom text chat, but I encourage students to use that space to ask and answer questions for each other.

I intend to record every lecture and recitation through Zoom and make the videos available to all students (barring technical failure).

Grading Scheme

25%	Homework
5%	Quizzes
10%	Programming Project
30%	Midterm Exams, 15% each
30%	Final Exam

	A	B	C	D	F
+		87-89	77-79	67-69	
	93-100	83-86	73-76	63-66	<60
-	90-92	80-82	70-72	60-62	

Graded Assignments

- Homework will be assigned on most Wednesdays and will be due (via upload through Canvas) by the beginning of class the following Wednesday. Late homework will not be graded (grade = 0 for that assignment).
- Quizzes will directly precede (and pair with) the homework assignments. You get full credit for a submitted quiz, and no credit for an unsubmitted quiz.
- Midterm and final examinations will be administered via Zoom. Students will scan and upload their exams through Canvas before disconnecting.
- If it happens, large-scale exam grade adjustment ("curving") will only happen at my discretion. Please don't pre-emptively ask for it to be done.

Quizzes, Homeworks, & “The Project”

“Quizzes” are in fact homework preparation, designed to be small-scale introductions to the material. They will be assigned Monday to be completed before class on Wednesday. After uploading the Quiz solution to Canvas, you will be able to watch the solution video and take a self-assessment questionnaire. Although participation in Quizzes make up a small fraction of the overall grade (5%), completing them will greatly aid your Homework efforts. Homework will be assigned at the beginning of class on Wednesdays and will be due before the beginning of class the following Wednesday. Late homework will not be accepted unless a valid reason has been provided to the instructor *before* the time it is due.

Discussion of homework problems between classmates is encouraged and is not considered academic dishonesty. However, the direct copying of homework or the exchange of any computer files is forbidden. It is the student’s responsibility to be familiar with the UNH student handbook which documents the Student Rights, Rules and Responsibilities.

In order to facilitate the grading of submitted homework assignments, please adhere to the following requirements:

1. Every page should have your name written at the top of the page. The first sheet of your work shall have this information across the top: Course No./Course Title/H.W. Set No./Name (last, first).
2. All work is to be submitted written on one side of the paper, with clean erasures (not scratched out work). Keep problems in the order assigned and separate each problem by a heavy line across the entire sheet. Identify answers by enclosing them in an oval or box.
3. A neat, labeled sketch of the problem setup should be included. The assumptions made for each problem must be clearly stated. Label all plots completely as to title and axes, including dimension and scales.
4. Include the proper complete units associated with the quantities calculated. Use the standard nomenclature of the S.I. or English system unless others are specified.

A scientific programming project will be assigned in three phases, each with a separate due date and list of deliverables. This will involve using MATLAB to solve a series of project-oriented problems and (finally) documenting this work in the form of a report. You will only have one Homework or Project Deliverable active at a given time.

More Details on Course Modality

This class is beginning the semester operating in a Yellow mode of operation (see <https://www.unh.edu/coronavirus/operation>). The type of remote learning we will use in this course is Zoom synchronous at regular time. As a result, shifting to an Orange or Red mode of university operation will not change this course’s modality.

As stated above, I intend to record every lecture and recitation through Zoom (barring technical failure). Such recordings may be available for educational use by students enrolled in the class (including both for instruction and as a review tool), myself, the TAs, and other university officials who support course instruction. Your voice or image may be captured on the recordings, and by enrolling in this course you are consenting to such recording for these purposes. The university and Zoom have FERPA-compliant agreements in place to protect the security and privacy of UNH Zoom accounts. You may not share recordings outside of this course. Doing so may result in disciplinary action.

Students must learn how to access this course through Canvas and Zoom. Ensure that you have all necessary technology to participate in this course remotely. Consult with me and/or with UNH IT for Students if you have any questions.

Exam Scheduling and Remote Proctoring

Exams will be proctored through Zoom during marked class and exam dates/times. Students will scan/capture their work and upload the document through Canvas. Within the first weeks of the semester, we will run a sample test that involves students uploading a scanned PDF through Canvas. You will be asked to agree to the use of a webcam and recording during the sample test. It is my goal to create a learning experience that is as accessible as possible. If you anticipate any issues related to the testing requirements of this course or need accommodations, please either discuss them directly with me or in conjunction with the Student Accessibility Services Office within the first week of classes to explore alternative options.

All Spring 2021 final exams will follow normal practice.

Academic Integrity

You are required to comply with all University policies regarding Academic Honesty:

<http://www.unh.edu/vpsas/handbook/academic-honesty>. Suspected violations of academic honesty are handled following Section 9.7, Procedures for Dealing with Academic Misconduct in the Student Rights, Rules, and Responsibilities Handbook, and may result in probation, deferred suspension, suspension, or expulsion. Do honest work; anything else deprives yourself of a learning opportunity that you only have for a short time.

Conduct and Respect for Peers

All participants in ME 603 (including myself, the TAs, and the students) shall treat each other with respect and collegiality. We endeavor to create a welcoming, friendly, and inclusive environment for everyone, regardless of their appearance, age, background, ability, identity, race, national or ethnic origin, religious beliefs, socioeconomic status, gender identity and expression, or sexual orientation. To do otherwise brings harm to and marginalizes individuals who are here to learn and grow.

Participation is of great importance to an intellectually vibrant class experience. To this end, in order to ensure a climate of learning for all, disruptive or inappropriate behavior (repeated outbursts, disrespect for others, etc.) may result in exclusion (removal) from this class. This would apply to an in-person class and remains just as true in our strange era of remote learning.

Accommodations for Students with Disabilities

The University is committed to providing students with documented disabilities equal access to all university programs and facilities. If you think you have a disability requiring accommodations, please contact Student Accessibility Services (SAS) at 201 Smith Hall. If you have received an accommodation letter for this class, please contact me immediately so we can discuss the necessary arrangements. SAS may be contacted at <http://www.unh.edu/disabilityservices/clockwork>, (603) 862-2607, sas.office@unh.edu.

Class Schedule

WEEK	DATES	TOPIC(S)	BOOK CHAPTER(S)
Week 1	February 1 st , 3 rd , & 5 th	Introduction to Heat Transfer	Chap. 1
Week 2	February 8 th , 10 th , & 12 th	Introduction to Conduction	Chap. 2
Week 3	February 15 th , 17 th , & 19 th	1D Steady-State Conduction	Chap. 3
Week 4	February 22 nd , 24 th , & 26 th	1D Steady-State Conduction	Chap. 3
Week 5	March 1 st , 3 rd , & 5 th	2D Steady-State Conduction	Chap. 4
Week 6	March 8 th , 10 th , & 12 th	2D Steady-State Conduction	Chap. 4
Week 7	March 15 th & 17 th	1D Transient Conduction	Chap. 5
	March 19 th	No Class	
Week 8	March 22 nd	Exam 1 Review	
	March 23 rd	Exam 1 (Tuesday Recitation)	
	March 24 th & 26 th	Radiation	Chap. 12
Week 9	March 29 th , 31 st , & April 2 nd	External Convection	Chap. 6 & 7
Week 10	April 5 th , 7 th , & 9 th	External & Internal Convection	Chap. 7 & 8
Week 11	April 12 th & 14 th	External & Internal Convection	Chap. 7 & 8
	April 16 th	No Class	
Week 12	April 19 th	Internal Convection	Chap. 8
	April 21 st & 23 rd	Heat Exchangers	Chap. 11
Week 13	April 26 th	Exam 2 Review	
	April 27 th	Exam 2 (Tuesday Recitation)	
	April 28 th & 30 th	Free Convection	Chap. 9
Week 14	May 3 rd , 5 th & 7 th	Scientific Computing	
Week 15	May 10 th	Course wrap-up	
	May 18 th , 1:00 PM - 3:00 PM	COMPREHENSIVE FINAL	

Assignment Schedule

NAME	TOPIC	ASSIGNED	DUE
Quiz 01	General Heat Transfer	February 8 th	February 10 th
Homework 01		February 10 th	February 17 th
Quiz 02	Conduction Generation	February 15 th	February 17 th
Homework 02		February 17 th	February 24 th
Project Deliverable 01		February 24 th	March 10 th
Quiz 03	2D Steady-State Conduction	March 8 th	March 10 th
Homework 03		March 10 th	March 17 th
Quiz 04	1D Transient Conduction	March 15 th	March 17 th
Homework 04		March 17 th	March 24 th
Exam 01	Conduction		March 23 rd
Project Deliverable 02		March 24 th	April 7 th
Quiz 05	Radiation	April 5 th	April 7 th
Homework 05		April 7 th	April 14 th
Quiz 06	Convection	April 12 th	April 14 th
Homework 06		April 14 th	April 21 st
Quiz 07	Heat Exchangers	April 19 th	April 21 st
Homework 07		April 21 st	April 28 th
Exam 02	Radiation, Convection, & Heat Exchangers		April 27 th
Project Final Deliverable		April 28 th	May 10 th
Final Exam	E V E R Y T H I N G		May 18 th