MEEN 3210.001 Heat Transfer Spring 2018

Instructor: Richard Zhang
Office: Discovery Park F101R (Mechanical and Energy Engineering)
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Lecture Time: Tuesday & Thursday 10:00am-11:20am
Lecture Location: Discovery Park Room B140

Instructor Office Hours: Tuesday & Thursday, 1:00pm-2:30pm
TA: Nastaran Barhemmati
TA Office Hours: Monday & Wednesday, 1:00pm-2:30pm (D206A)

Required Textbook: ***Introduction to Heat Transfer, 6th edition***
Berman, Lavine, Incropera, and DeWitt,
ISBN-13: 978-0-470-50196-2

Pre-Requisites: MEEN 3120: Fluid Mechanics
MEEN 3110: Thermodynamics
MEEN 3250: Analytical Methods

Course Description:
3 hours. A basic course covers the fundamentals of heat transfer by conduction, convection and radiation, together with applications to typical engineering systems. Topics include one- and two-dimensional steady state heat conduction, transient heat conduction, internal convection, external convection, natural convection, and radiation heat transfer.

Course Learning Outcomes:
Upon successful completion of this course, students will able to:
- Apply conservation of mass, momentum, and energy to heat transfer problems.
- Understand the concepts of one-dimensional steady-state heat conduction.
- Understand the concepts of multi-dimensional steady-state heat conduction.
- Understand the concepts of transient heat conduction.
- Use thermal Ohm's law (thermal circuits) to solve heat transfer problems.
- Understand the concepts of internal forced convection for both laminar and turbulent flows.
- Understand the concepts of external forced convection for both laminar and turbulent flows.
- Understand the concepts of natural convection.
- Understand the basic theory behind radiation heat transfer.

Grades:

Homework	20%	A: ≥ 85%
In-Class Quizzes	5%	B: 70-84.9%
Midterm Exam 1	20%	C: 55-69.9%
Midterm Exam 2	20%	D: 40-54.9%
Final Exam	35%	F: < 40%
Total	100%	

Class Policy:

(1) Come in on time before the class starts.
(2) Review the materials covered/taught in the previous class before coming to the class.
(3) Bring the textbook either as a hard copy or as an e-book to every class. This will help in following the class worked-out examples as well as the materials covered that day and assigned for further reading.
(4) Participate in Q&A.
(5) Review Laws of Thermodynamics and its application to conservation of energy.
(6) Review fluid mechanics, particularly boundary layers flows: internal and external.
(7) Refresh your background in calculus and ordinary differential equations.

Homework Policy:

(1) Please turn in your homework on the due day before the lecture starts. Homework will not be collected once lecture starts.
(2) Homework can be turned in earlier than the due date.
(3) Homework dropped in the instructor's departmental mailbox will NOT be collected.
(4) Homework slid into the instructor's office will NOT be collected.
(5) Homework dropped in the "homework dropbox" in front of the department door will NOT be collected.
(6) If you want to turn in your homework other than the due day or if you want to turn in your homework outside the classroom, you need to turn in your homework to the instructor either IN PERSON or a scanned copy through email.
(7) You can ask your friend/classmate to turn in homework for you.
(8) You can scan and email the homework before the class ends (11:20am).
(9) Homework must be stapled, instructor or TA will not be responsible for lost homework.
(10) Exceptions (late homework will be collected): medical emergency (student and important ones), transportation/traffic emergency, religious holidays/duty, jury duty and military duty. Evidence must be submitted.
(11) Having no textbook is not a valid excuse for not doing your homework. It is the student's responsibility to acquire textbook for his/her study and bring to the classroom.
(12) Failure to turn in more than 2 homework assignments will result in automatic failure.

Exams and Quizzes:

(1) Quizzes are open book and open notes. **Exams are closed book closed notes with formula sheets.**
(2) Hand-written formula sheets can be maximum 4 pages, A4 or letter size, front and back.
(3) Each student is responsible for preparing his/her own formula sheets.
(4) Formula sheets could include anything EXCEPT solutions to homework, and photos or scans of pages from the textbook. Student who failed to follow this rule will score zero in the exam and this cheating matter will be reported to the department and university.
(5) Formula sheets must be turned in with the exam papers (in the case of formula sheets were not checked by the instructor during the exam). Student who fails to follow this rule will score zero in the exam and this matter will be reported to the department and university.
(6) **There will be NO make-up quiz. There will be NO make-up exam.** Exceptions: medical emergency (student and important ones), transportation/traffic emergency; religious holidays/duty, jury duty and military duty. Documentary evidences must be submitted.

Disability Accommodations: If you need academic accommodations for disability you must have document which verifies the disability and makes you eligible for accommodations, then you can schedule an appointment with the instructor to make appropriate arrangements. For more information, refer the Office of Disability Accommodation website at: https://disability.unt.edu/

ABET Student Learning Outcomes
Ability to apply mathematics, science and engineering principles.
Ability to identify, formulate and solve engineering problems.

Academic Dishonesty:

There is a zero tolerance policy. Cheating of whatsoever will result in an automatic 'F' in this course and the matter will be turned over to the appropriate student disciplinary committee.

IMPORTANT EXAM DATES

Midterm Exam #1 (Schedule is subject to change):

Feb. 15th, 2018, Thursday, 10:00am-11:20am, Room B140

Midterm Exam #2 (Schedule is subject to change):

Apr. 5th, 2018, Thursday, 10:00am-11:20am, Room B140

Final Exam (UNT official final schedule):

May 10th, 2018, Thursday, 8:00am-10:00am, Room B140

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Schedule Overview

(Subject to change)

Week	Date	Lecture Topics	Homework/ Exam
#1	Jan.16th Jan.18th	Overview of syllabus; Ch.1: Introduction to heat transfer: Three modes of heat transfer	
		Ch.1: Introduction to heat transfer: Thermodynamics & Methodology	
#2	Jan.23rd Jan.25th	Ch 2: Introduction to conduction: Thermal Conductivities; The Heat Diffusion Equation	Homework 1
		Ch 3: One Dimensional, Steady-State Conduction: Plane Wall and Cylinder	
#3	Jan.30th Feb.1st	Ch 3: One Dimensional, Steady-State Conduction: Thermal Circuit Method	
		Ch 3: One Dimensional, Steady-State Conduction: with Heat Generation	Homework 2
#4	Feb.6th Feb.8th	Ch 3: One Dimensional, Steady-State Conduction: Extended Surface & Ch 4: 2D Heat Conduction and Shape Factor	
		Ch 3: One Dimensional, Steady-State Conduction: Complex Systems and Examples	
#5	Feb.13th Feb.15th	Ch 5: Transient conduction: Lumped Capacitance Method	Homework 3
		Thursday, Feb.15th, Midterm Exam #1: covers Chapters 1, 2, 3 and 4	Exam 1
#6	Feb.20th Feb.22nd	Ch 5: Transient conduction: Exact Solution & one term approximation	
		Ch 5: Transient conduction: Semi-Infinite Solid	
#7	Feb.27th Mar.1st	Ch 6: Introduction to convection: Convection Boundary Layers, and Flow Types	Homework 4

		Ch 6: Introduction to convection: Governing Equations and Non-dimensional Numbers	
#8	Mar.6th Mar.8th	Ch 7: External Flow: Flat Plate in Parallel Flow	
		Ch 7: External Flow: Flat Plate in Parallel Flow	Homework 5
#9	Mar.12th Mar.16th	Spring break (No classes)	
#10	Mar.20th Mar.22nd	Ch 7: External Flow: Cylinder & Sphere	
		Ch 8: Internal Flow : Hydrodynamic & thermal considerations	Homework 6
#11	Mar.27th Mar.29th	Ch 8: Internal Flow : Energy Balance	
		Ch 8: Internal Flow: Convection Correlations	
#12	Apr.3rd Apr.5th	Exam Review	Homework 7
		Thursday, Apr. 5th, Midterm Exam #2: covers Chapters 5, 6, 7 and 8	Exam 2
#13	Apr.10th Apr.12th	Ch 9: Free convection	
		Ch 9: Free convection	
#14	Apr.17th Apr.19th	Ch 10: Boiling and Condensation	Homework 8
		Ch 11: Heat Exchangers	
#15	Apr.24th Apr.26th	Ch 12: Radiation Processes and Properties	Homework 9
		Ch 12: Radiation Processes and Properties	
#16	May.1st May.3rd	Ch 13: Radiation Exchange between Surfaces; Multimode Heat Transfer	
		Pre-final day, Exam Review	HW 10
#17	May 10th	Final Exam. Covers all Chapters: conduction, convection, and radiation heat transfer (Thursday, May 10th, 2018, 8:00am-10:00am)	Final Exam

Document History:
Dr. Sandra Boetcher prepared on 1/08/2011
Dr. Xiaohua Li, modified on 1/10/2012; 1/13/2013; 8/23/2013; 8/18/2014
Dr. Weihuan Zhao, modified on 8/24/2015; 8/29/2016; 12/29/2016, 01/17/2017
Dr. Richard Zhang, modified on 12/20/2017

Disclaimer
The course schedule, content, and assignments are subject to modification when circumstances dictate and as the course progresses. If changes are made, you will be given due notice.

Link for **Spring 2018 Final Exams - Discovery Park**
http://registrar.unt.edu/exams/final-exam-schedule/spring