



MECH 395 – Introduction to Heat and Mass Transfer

Term – Fall 2016 (201609)

Instructor

Andrew Rowe
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Office Hours Dr.

Days: Tuesday
Time: 11:30-1:30
Location: EOW 527

Prerequisites and co-requisites: MECH 240 and MECH 345

LECTURES

Section:	Days:	Time:	Location:
A01 / CRN 12286	Mon and Thur	10:00-11:20	ECS 125

TUTORIAL SECTIONS

T01	Fri	16:30-17:20	ECS 125

LAB SECTIONS

B01 - 12287	Wed	12:30-15:20	ELW A140
B02 - 12288	Tue	12:30-15:20	ELW A140
B03 - 12289	Fri	12:30-15:20	ELW A140
B04 - 12290	Mon	17:00-19:50	ELW A140

Note: See detailed schedule for timings of specific labs.

TA Name

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Required Text

Title:	Fundamentals of Heat and Mass Transfer
Author:	Bergman, T., Lavine, A., Incropera, F.P., Dewitt, D.P.
Publisher:	John Wiley & Sons
Year:	2011

Course Objectives

To be able to classify modes of heat transfer, apply rate expressions to model thermal phenomena, and develop analytic skills for thermal design and analysis. Fundamentals of heat transfer are introduced and explored. An introduction to heat transfer modes (conduction, convection and radiation) is followed by analytic methods to determine temperature distributions and heat transfer rates. Extended surfaces, transient and multi-dimensional conduction; internal and external forced convection; heat exchanger analysis; heat transfer correlations and problem solving methods.

Learning Outcomes

1. List modes of heat transfer and their constitutive relations
 - a. Identify heat transfer interactions
2. Calculate heat transfer rates and temperatures
 - a. Create thermal resistance networks
 - b. Solve systems of network equations
 - c. Develop approximate numerical solutions to heat transfer equations
 - d. Calculate convective heat transfer coefficients
 - e. Estimate overall thermal resistance/transfer coefficients
3. Derive energy balance expressions
 - a. Derive control volume balances
 - b. Create surface balance expressions
 - c. Derive boundary conditions to solve governing equations
4. Understand parameters governing transient thermal problems
 - a. Identify when lumped approximations are valid
5. Analyse structures for heat transfer
 - a. Evaluate effectiveness of finned arrays
 - b. Perform sizing calculations for heat exchangers
 - c. Propose design changes to improve heat transfer/thermal isolation

Assessment:

Assignments	10%	Due Dates: See course schedule
Labs	15%	Due Dates: See course schedule
Quizzes (2)	25%	Date: See course schedule
Final Exam	50%	

Note:

Failure to pass the final exam will result in a failing grade for the course. The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.

Assignment of E grade and supplemental examination for this course will be at the discretion of the Course Instructor. The rules for supplemental examinations can be found in the current Undergraduate Calendar.

GENERAL INFORMATION

Note to Students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Secretary to set up an appointment.

"Attendance"

Students are expected to attend all classes in which they are enrolled. An academic unit may require a student to withdraw from a course if the student is registered in another course that occurs at the same time....

An instructor may refuse a student admission to a lecture, laboratory, online course discussion or learning activity, tutorial or other learning activity set out in the course outline because of lateness, misconduct, inattention or failure to meet the responsibilities of the course set out in the course outline. Students who neglect their academic work may be assigned a final grade of N or debarred from final examinations.

Students who do not attend classes must not assume that they have been dropped from a course by an academic unit or an instructor. Courses that are not formally dropped will be given a failing grade, students may be required to withdraw and will be required to pay the tuition fee for the course." UVic Calendar, (2016) <http://web.uvic.ca/calendar2016-09/undergrad/info/regulations/attendance.html>

Course Lecture Notes

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

Course Experience Survey

I value your feedback on this course. Towards the end of term you will have the opportunity to complete a confidential course experience survey (CES) regarding your learning experience. The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. When it is time for you to complete the survey, you will receive an email inviting you to do so. If you do not receive an email invitation, you can go directly to <http://ces.uvic.ca>. You will need to use your UVic NetLink ID to access the survey, which can be done on your laptop, tablet or mobile device. I will remind you nearer the time, but please be thinking about this important activity, especially the following three questions, during the course.

1. What strengths did your instructor demonstrate that helped you learn in this course?
2. Please provide specific suggestions as to how the instructor could have helped you learn more effectively.
3. Please provide specific suggestions as to how this course could be improved."

Accommodation of Religious Observance (AC1210)

<http://web.uvic.ca/calendar2016-09/general/policies.html>

Discrimination and Harassment Policy (GV0205)

<http://web.uvic.ca/calendar2016-09/general/policies.html>

Faculty of Engineering, University of Victoria Standards for Professional Behaviour

"It is the responsibility of all members of the Faculty of Engineering, students, staff and faculty, to adhere to and promote standards of professional behaviour that support an effective learning environment that prepares graduates for careers as professionals...."

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour which contains important information regarding conduct in courses, labs, and in the general use of facilities.

<http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf>

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the Undergraduate Calendar for the UVic policy on academic integrity.

Policy on Academic Integrity

<http://web.uvic.ca/calendar2016-09/undergrad/info/regulations/academic-integrity.html>

Problem Sets: Due Thursdays at 16:30 in drop box - schedule may change. See Coursespaces for due dates.

Week		Lecture		Tutorial	Labs		Notes
Module 1	1	Sept 4-10	Th	1. Introduction	N		
	2	Sept 11-17	M Th	2. Modes of Heat Transfer 3. Conduction/Diffusion	1		
	3	Sept 18-24	M Th	4. Thermal Resistance I 5. Thermal Resistance II	2		PS 1 – Due
	4	Sept 25-1	M Th	6. Energy Generation 7. Extended Surfaces I	3	Lab 1 B4 B1/B2 B3	PS 2 - Due
	5	Oct 2-8	M Th	8. Extended Surfaces II 9. 2-D Conduction	4	Lab 1 B4 B1/B2 B3	PS 3 - Due
	6	Oct 9-15	M Th	THANKSGIVING Quiz 1: L 1 – 8	5		
	7	Oct 16-22	M Th	10. Numerical Solutions 11. Numerical Solutions II	6		
	8	Oct 23-29	M Th	12. Transient Analysis 13. Transient One-term	7	B4 A B1/B2 A B3 A	PS 4 – Due
	9	Oct 30-5	M Th	14. Transient Numerical 15. Intro to Convection	8	Lab 2 B4 B B1/B2 B B3 B	PS 5 – Due
	10	Nov 6-12	M Th	READING BREAK Quiz 2: L 1 – 13	9		
Module 3	11	Nov 13-19	M Th	16. External 17. Internal	10	Lab 2 B4 C B1/B2 C B3 C	
	12	Nov 20-26	M Th	18. Condensor/Evaporator 19. Heat Exchangers	11		PS 6 - Due
	13	Nov 27-3	M Th	20. Integrated Analysis 21. Review	N		PS 7 - Due