University of Arkansas
Mechanical Engineering Department
MEEG 5453 - Advanced Heat Transfer
Distance Syllabus

Instructor - Rick J. Couvillion, ME 208, 479-575-4155, rjc@uark.edu , website

References:
Frank P. Incropera and David P. DeWitt, *Fundamentals of Heat and Mass Transfer*, 5th Ed, Wiley, 2002.
Vedat S. Arpaci, *Conduction Heat Transfer*, Addison-Wesley, 1966.
W.M. Kays and M.E. Crawford, *Convective Heat and Mass Transfer*, 3rd Ed., McGraw-Hill, 1993. (Text used in MEEG 5463)
H.S. Carslaw and J.C. Jaeger, *Conduction of Heat in Solids*, Oxford, 1959.
Adrian Bejan, *Convection Heat Transfer*, Wiley, 1984.
H. Schlicting, *Boundary Layer Theory*, McGraw-Hill, 1960.
Louis C. Burmeister, *Convective Heat Transfer*, Wiley, 1983.
M. Modest, *Radiative Heat Transfer*, McGraw-Hill, 1993. (Text used in MEEG 5473)
Siegel and Howell, *Thermal Radiation Heat Transfer*.

Lectures - Recorded lectures are accessed in the 'Recorded Lectures' link on Blackboard. On average, 5 recorded lectures per week will be covered. There are lecture notes that each cover roughly 1½ recorded lectures that can be downloaded via the 'Lecture Notes and Schedule' link on Blackboard. Course content and schedule shown below.

Drills - There will typically be one online drill each week using Blackboard Collaborate. Instructions for signing on to a Collaborate drill session are available in the ‘Downloads’ folder on Blackboard. Drills will focus on questions about the lectures and the homework.

Communications - UA emails for all class members will be provided to encourage collaboration. If the class finds discussion groups useful, they will be set up on Blackboard.

Grade Basis - Three Exams - 90%, Programs/Homework - 10%

Homework - Homework assignments 01 - 04 must be submitted before Exam 01 will be given. Assignments 05 - 07 must be submitted before Exam 02. Homework done by hand should be scanned and submitted as a single pdf file. One or more programs may require computer programming using Excel, Basic, Matlab, FORTRAN, or C.

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Lecture Notes and Schedule - Distance

Week	Lecture Notes	Topic
1	Lecture 01	2D Heat Equation
	Lecture 02	Nondimensioning, Anisotropic Media
	Lecture 03	Solution Methods
	Lecture 04	Numerical Solutions
2	Lecture 05	Transient Heat Transfer
	Lecture 06	Transient 2D Conduction with Generation
	Lecture 07	Transient with Time-varying Inputs - Duhamel's Theorem
	Lecture 08	Transient Numerical
3	Lecture 09	Steady State Nondimensional with ANSYS
		Exam 01 - Lecture Notes 01-09 - 37% of exam average
		Recorded lectures 1 - 13 (0:00-21:35)
	Lecture 10	Mass, Momentum Conservation in Fluids
	Lecture 11	Energy Conservation
4	Lecture 12	Boundary Layer Flow
	Lecture 13	Boundary Layer Flow - cont
	Lecture 14	Analogies, Examples
	Lecture 15	Internal Flow Intro
5	Lecture 16	Nusselt Number in Ducts
	Lecture 17	Turbulence Intro
	Lecture 18	Turbulent Velocity Distribution
	Lecture 19	Turbulent Drag, Temperature Distribution, Nu
6	Lecture 20	Turbulent Duct Flow
		Exam 02 - Lecture Notes 10-20 - 37% of exam average
		Recorded Lectures 13 (22:00-end) - 29
	Lecture 21	Radiation Intro
	Lecture 22	Blackbody Emission, Band Emission
7	Lecture 23	Emissivity, Irradiation, Absorptivity
	Lecture 24	View Factors
	Lecture 25	Exchange Among Surfaces
8		Exam 03 - Lecture Notes 21-25 - 26% of exam average
		Recorded Lectures 30 - 40