

## ME 520 Course Schedule - Spring 2025

Date	Period	Topic	Reading		
<i>January</i>					
Tu 21	1	Course Organization and Objectives	none	Basics	
Th 23	2	Diffusive Heat Conduction Fundamentals I	Ch. 1 HO		
Tu 28	3	Diffusive Heat Conduction Fundamentals II	Ch. 1 HO		
Th 30	4	Mathematics for Boundary Value Problems I	Ch. 2 HO		
<i>February</i>					
Tu 4	5	Mathematics for Boundary Value Problems II	Ch. 2 HO	Analytical Methods for Classical Conduction Problems	
Th 6	6	Numerics of Fourier Series Solutions	Ch. 2 HO		
Tu 11	7	Separation of Variables in the Cartesian System I	Ch. 3 HO		
Th 13	8	Separation of Variables in the Cartesian System II	Ch. 3 HO		
Tu 18	9	Separation of Variables in the Cartesian System III	Ch. 3 HO		
Th 20	10	Separation of Variables in the Cylindrical System I	Ch. 4 HO		
Tu 25	11	Separation of Variables in the Cylindrical System II	Ch. 4 HO		
Th 27	12	Separation of Variables in the Spherical System	Ch. 5 HO		
<i>March</i>					
Tu 4	13	Time-Dependent Boundary Conditions	Chs. 7, 8 HO		
Th 6	14	Part I Exam*	Periods 1-12		
Tu 11	15	Use of Green's Functions	Ch. 8 HO		
Th 13	16	Use of Laplace Transforms	Ch. 9 HO		
Tu 18	--	Spring Break	--		
Th 20	--	Spring Break	--		
Tu 25	17	Phase Change Problems	Ch. 12 HO		
Th 27	18	Thermal Conduction in Anisotropic Materials	Ch. 15 HO		
<i>April</i>					
Tu 1	19	Electrons, Phonons, and Molecules as Heat Carriers I	Ch. 1, 16 HO	Mechanisms	
Th 3	20	Electrons, Phonons, and Molecules as Heat Carriers II	Ch. 16 HO		
Tu 8	21	Multiphysical Effects	To Be Determined	Numerics	
Th 10	22	Heterogeneous/Composite Materials	Ch. 10 HO; Chs. 17, 18 T		
Tu 15	23	Numerical Methods Introduction	Chs. 1, 2 MM		
Th 17	24	Numerical Methods (cont'd) and Steady Finite Volume Method (FVM)	Ch. 3 MM		
Tu 22	25	FVM: $k(T)$ , Space-Varying Properties, Source Linearization	Ch. 3 MM		
Th 24	26	FVM: Unsteady Conduction and Stability	Ch. 3 MM		
Tu 29	27	FVM: Error Analysis, Stability and Orthogonal, Structured Meshes	Ch. 3, 4 MM		
<i>May</i>					
Th 1	28	Special Topics	To Be Determined		
Tu 6	29	Part II Exam*	Periods 13-27		
Th 8		--	--		
Tu 13	--	Article Assessment Report Due	--		

\*The duration of exams will be longer than the associated period normally dedicated for lecture on the day of the exam.

### Assigned reading key

HO: "Heat Conduction" by Hahn and Ozisik (3rd Edition, Wiley, 2012)

MM: "Numerical Methods in Heat, Mass, and Momentum Transfer" by Murthy and Mathur (Draft Notes, 2002)

T: "Random Heterogeneous Materials" by Salvatore Torquato (Springer-Verlag, 2002)