

**ME 597 – SOLID MECHANICS I**  
Schedule for Fall 2022

<b>PER</b>	<b>DATE</b>	<b>TOPIC</b>	<b>READING ASSIGNMENT</b>
1 M	22-Aug	Scalar, vector, matrix, and tensor	1.1-1.3
2 W	24-Aug	Coordinate transformation and principal values/directions of 2 <sup>nd</sup> order tensors	1.4-1.6
3 F	26-Aug	Algebra and calculus of tensors	1.7-1.9
4 M	29-Aug	Kinematics of finite deformation	2.1
5 W	31-Aug	Geometric construction of infinitesimal deformation	2.2
6 F	2-Sep	Strain transformation, strain compatibility, curvilinear coordinates.	2.3-2.7 (HW1 due)
M	5-Sep	<b>Labor Day – no class</b>	
7 W	7-Sep	Tractions and stresses	3.1-3.2
8 F	9-Sep	Stress transformation, principal stresses, 3D Mohr's circle	3.3-3.4 (HW2 due)
9 M	12-Sep	Equilibrium equations in Cartesian and curvilinear coordinates	3.5-3.8
10 W	14-Sep	Materials behavior – constitutive relations	4.1-4.2
11 F	16-Sep	Stiffness tensor and materials symmetry	11.1-11.2 (HW3 due)
12 M	19-Sep	Anisotropic stiffness tensors	11.1-11.2
13 W	21-Sep	Isotropic elastic materials	4.3-4.4
14 F	23-Sep	Review of field equations and boundary conditions	5.1-5.2 (HW4 due)
15 M	26-Sep	Boundary value problems and displacement formulation N-L equations	5.2-5.4
16 W	28-Sep	Stress formulation B-M equations	5.2-5.4
17 F	30-Sep	Principle of superposition and Saint-Venant's principle	5.5-5.8 (HW5 due)
18 M	3-Oct	Strain energy and bounds of elastic constants	6.1-6.2
19 W	5-Oct	Uniqueness of solution, Clapeyron's theorem, Betti's reciprocal theorem	6.3-6.4
F	7-Oct	<b>Mid-term examination, 8-10PM EST (no lecture)</b>	
M	10-Oct	<b>October Break – no class</b>	
20 W	12-Oct	Principle of virtual work	6.5-6.8
21 F	14-Oct	Principle of minimum potential and complementary energy, Rayleigh-Ritz method	6.5-6.8 (HW6 due)
22 M	17-Oct	Two-dimensional formulations: Plane strain problems	7.1
23 W	19-Oct	Plane stress and generalized plane stress	7.2-7.3
24 F	21-Oct	Airy stress function and polar formulation	7.4-7.6 (HW7 due)
25 M	24-Oct	Classical 2D elastostatic problems: Review of mechanics of materials	Appendix D, 8.1
26 W	26-Oct	Cartesian solutions using polynomials/beam problems	8.1-8.2
27 F	28-Oct	General Michell solution in polar coordinate	8.3 (HW8 due)
28 M	31-Oct	Lame problems/pressurized hole in an infinite media	8.4
29 W	2-Nov	Lame problems/stress-free hole in an infinite media under various loads	8.4
30 F	4-Nov	Wedge problems	8.4 (HW9 due)
31 M	7-Nov	Half-space problems/Flamant problem	8.4
32 W	9-Nov	Half-space problems/Notch and crack problems	8.4
33 F	11-Nov	Diametrically compressed disks and rotating disks	8.4(HW10 due)
34 M	14-Nov	Extension, torsion, and flexural of prismatic bars	9.1-9.2
35 W	16-Nov	Torsion of non-circular prismatic bars: Prandtl stress function	9.3
36 F	18-Nov	Membrane analogy and torsion solutions	9.3 (HW11 due)
37 M	21-Nov	Torsion solutions for various cross sections	9.4-9.8
W	23-Nov	<b>Thanksgiving – no class</b>	
F	25-Nov	<b>Thanksgiving – no class</b>	
38 M	28-Nov	Revisit anisotropic elasticity	11.3
39 W	30-Nov	Torsion of an anisotropic prismatic bar	11.4
40 F	2-Dec	Thermoelasticity: heat conduction and uncoupled field equations	12.1-12.2
41 M	5-Dec	Two dimensional thermoelasticity problems	12.3
42 W	7-Dec	Polar coordinate formulation of thermoelasticity	12.6-12.7
F	9-Dec	Review for final exam	HW12 due (optional)

\* Textbook "Elasticity Theory, Applications and Numerics", Martin H. Sadd, 4<sup>th</sup> Edition.