

Week 1: *Position, Motion, Displacement*

READ: Spencer: Preface, Chapter 1.
 Fung Handout: pps. 1-14, Example 3, p.39.
 Spencer: 4.1, 4.2, 3.1, (2.4)-(2.5) in 2.1, Example (e) in 2.2.
 Chadwick: Section 1 of Chapter 1.
 Holzapfel Handout: pps. 1-8, 55-64.

Week 2: *Velocity, Acceleration, Material/Spatial Descriptions, Material Time Derivative, Gradient Review*

READ: Spencer: 4.3, 4.4.
HW 1 Assigned.

Week 3: *grad, div, grad v in Cartesians, Einstein's summation convention, tensors, linear transformations, tensor product*

READ: Spencer: 2.1, 2.2.

Week 4: *Identity tensor, basis tensors, components of tensors, tensor calculus*

READ: Your notes!
HW 1 Due 1/30.
HW 2 Assigned.

Week 5: *Divergence/divergence of a tensor field. More tensor properties (linear algebra, transpose, inverse, determinant, geometric ideas, relation to cross product). Rigid Body Motion, orthogonal tensors.*

READ: Your notes! And:
 Spencer: 6.1 and 3.6.

Week 6: *No class due to Assessment Day, Snow Day, and Florida Day. Make-up for missed Snow Day will be held sometime!?! We'll make a plan in class.*

Groups assigned for Final Project: Group 1: Ricky, Callie, Laurence. Group 2: Duane, Catie, Daniel.

Week 7: *Begin analysis of deformation. Rotation tensors, deformation & displacement gradient tensors, incompressibility, stretch tensors, deformation & strain tensors, etc...*

HW 2 Due 2/22.

Looking Ahead: Our MIDTERM EXAM will be held on a Tues. or Thurs. during the last two weeks of March. Exact date TBD. You may bring an 8 ½ x 11 sheet of paper with you; you can put anything you want on the sheet, front and/or back. Whatever you want.

SKIM: Spencer: 3.4 (ignore the M_{pi} stuff and be glad we did not define our tensors in this equivalent but awful way!)

SKIM (words only!): Spencer: 6.2, 6.3, 6.8.

READ: Spencer: 6.4, 6.5, 6.6 pp. 78-79, 6.9, 6.10.

Week 8: *Continue analysis of deformation. Interpretation of deformation tensor components. Extension of material line elements and changes in angles.*
READ: Your notes! And continue reading/skimming as assigned in Week 7.
HW 3 Assigned.

SPRING BREAK!!!!

Week 9: *Continue analysis of deformation. Interpretation of deformation tensor components. Extension of material line elements and changes in angles. Arc length and vector calculus applications.*
READ: Your notes! And continue reading/skimming as assigned in Week 7.
HW 3 Due.

MIDTERM EXAM will be held on Tues. March 27. You may bring an 8 ½ x 11 sheet of paper with you; you can put anything you want on the sheet, front and/or back.

ALSO, Preliminary proposals for FINAL PROJECT will be due THURS. April 5.

Week 10: *Continue analysis of deformation. Interpretation of deformation tensor components. Extension of material line elements and changes in angles. Lagrangian and Eulerian interpretations. Examples.*
READ: Your notes! And continue getting ready for our “Midterm” (2/3 term) Exam!

Week 11: *Continue analysis of deformation. Principal stretches, principal directions; eigenvalues, eigenvectors. Principal Isotropic Invariants.*
MIDTERM EXAM!!!
READ: Your notes! Spencer 2.3—2.5, 3.2—3.9, 6.2, 6.3, and 9.2—9.4.

Week 12: *Continue analysis of deformation. Cayley-Hamilton, Spectral, Square Root, and Polar Decomposition Theorems. Left and Right Stretch Tensors. START STRESS!!!!!!!!!!!!!! Traction, Forces, Stress, Cauchy’s Theorem.*
Preliminary proposal for Final Project Due no later than the BEGINNING of class Tues. 4/10!!! Be sure to give me enough info about the problem you plan to study (with references) and your attack on understanding/developing/expanding on/etc... the problem, and its relevance to the things we’ve been talking about in class. Think physically, mechanically, and mathematically!!
READ: Same things from Week 11.
HW 4 Assigned.

Week 13: *Cauchy Stress, Nominal Stress, Alternative Stress Tensors. Components of Stress Tensors and Physical Interpretation. Divergence Theorems and Integral Conservation Laws of Physics → Governing Equations of Motion/Equilibrium. States of Stress. Examples. Continued next week too!*
READ: Spencer: 5.1—5.3, 5.6—5.8 (think direct notation when reading the indices!)
Chadwick: Ch. 3 Section 3.

Preliminary proposal for Final Project Due no later than the BEGINNING of class Tues. 4/10 HW 4 Due.

Finalize date/time of evening MAKE-UP CLASS!!!!

Week 14: *Integral Conservation Laws of Physics → Governing Equations of Motion/Equilibrium. States of Stress. Examples. Continuation from last week + more—Constitutive laws! Sample Presentation from my research.*

READ: Spencer: 5.5, 5.9, 7.1—7.5, 10.1—10.3 (focus on: words, anything in direct notation)
Chadwick: Ch. 3 Sections 1, 2, and 4.

Prepare for Final Project!

Week 15: *Finish up Course Topics. Hooke's Law & Cauchy equations of motion for Linear Elastic Solids, Newtonian Viscous Fluids & the Navier-Stokes Equations, and Constitutive Equations for Nonlinear Elastic Solids*

Prepare for Final Project!

Finals Week: *Student Presentations! Tuesday May 1, 10:30AM-1:00PM. Roop 212.*