COURSE INFORMATION

Course Title	**Continuum Mechanics 1**
Instructor	Dr. Ahmad Ghasemi Ghalebahman
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Office Location	Mechanical Engineering Department, Semnan University, Semnan, Iran
Duration	16-week period
Grading Policy	Midterm Exam: 35%, Final Exam: 45%, Homework: 10% Project: 10%
Textbook(s)	G. T. Mase and G. E., Mase, **Continuum Mechanics for Engineers**, 2nd Ed. A. J. M. Spencer, **Continuum mechanics**, 1st Ed. W. M. Lai, D. Rubin and E. Krempl, **Introduction to Continuum Mechanics**, 4th Ed. J. N. Reddy, **An Introduction to Continuum Mechanics**, 2nd Ed.

COURSE OUTLINE

Topic	Week
Introduction Continuum Theory Contents of Continuum Mechanics Vector and matrix algebra	**1**
TENSORS The Indicial Notation Summation Convention Dummy and Free Indices	**2**
The Kronecker Delta The Permutation Symbol	**3**
Components of a Tensor Tensor Calculus Dyadic Product of Vectors	**4**
Orthogonal Tensors Transformations Law for Cartesian Vectors and Tensors	**5**
Eigenvalues and Eigenvectors of Tensors Principal Values and Principal Directions of Symmetric Tensors Tensor Invariants	**6**
Scalar Field and Gradient of a Scalar Function Vector Field and Gradient of a Vector Function Gradient and Divergence Curl and Laplacian	**7**
Polar Coordinates Cylindrical Coordinates Spherical Coordinates	**8**
Kinematics of a Continuum Motion Description of a Continuum Lagrangean (Material) and Eulerian (Spatial) Descriptions	**9**
Material Derivative and Acceleration Kinematic of a Rigid Body Infinitesimal Deformation and Infinitesimal Strain Tensor	**10**
The Rate of Deformation Tensor The Spin Tensor and the Angular Velocity Vector The Conservation Equation of Mass	**11**
The Equations of Compatibility Deformation Gradient Polar Decomposition Theorem	**12**