# Infosys-ICTS Chandrasekhar Lectures

I. Classical Lagrangian Elasticity
   A. Introduction
   B. Deformation and Strain
   C. Elastic energy
      1. Isotropic and uniaxial energies
      2. Voigt Notation
   D. Forces and stresses
   E. Coupling to external fields
   F. Affine and Non-affine response

II. Elastic Waves and Elastic Response
   A. Linearized sound waves
   B. Response and thermal fluctuations
   C. Elastic membranes

III. Lattice Models
   A. Central-force models
   B. Linearized limit
   C. Continuum limit

IV. Maxwell-Calladine relations and marginally coordinated lattices
   A. The Maxwell count of “floppy” lmodes
   B. States of self stress
   C. Equilibrium and compatibility matrices and the Calladine index theorem
   D. Periodic “Maxwell” lattices
   E. States of self stress and elasticity
   F. Guest-Hutchinson modes
   G. Kagome and twisted kagome lattices:
      1. States of self-stress and bulk zero modes
      2. Fully gapped bulk bands and zero-energy surface states

V. Topological mechanics
   A. Introduction
   B. The Su-Schrieffer-Heeger (SSH) model: topological invariants and surface states
      1. Electronic states of polyacetylene
      2. A mechanical SSH system
   C. Topological phonons
      1. Generalized kagome lattices
      2. Mechanical Graphene: Weyl modes
      3. Square and pyrochlore lattices

VI. Other topics
   A. Rubbers and strongly non-linear elasticity
   B. Nematic elastomers: broken symmetry and Goldston modes
   C. Filamentous networks
   D. Effective medium theory for random networks.