TOPICS

A.)   Transport and Diffusion

  i.)   Stochastic Magnetic fields (Kubo # < 1)
      a.)   lines (review basic description)
      b.)   heat; interaction of scattering, collisions
      c.)   particles, momentum
      d.)   hydrodynamic models

  ii.)   Ku > 1
      a.)   ideas in statistical topography
      b.)   concepts in percolation
      c.)   Dykhne method / random media
      d.)   stochastic magnetic fields, revisited (Ku > 1)

  iii.)   Shear Dispersion
      a.)   (G.I.) Taylor Problem
      b.)   Effective Diffusivity
      c.)   Systematics

  iv.)   Fat Tails / Fractional Kinetics
      a.)   Fokker-Planck fundamentals (review)
      b.)   The problem of fat tails, 'wild' vs 'mold' behavior
      c.)   Intro to Fractional Kinetics
      d.)   Simple Applications of FK
      e.)   Physics Issues in FK

  v.)   Self-Organized Criticality
      a.)   Events, big and small; Zipf's Law
      b.)   Sandpile/CA models; 1D, 2D; Basic ideas of BTW
      c.)   Earthquake distributions and models
      d.)   Avalanches; connection to FK
      e.)   Hydro models
      f.)   Jams
      g.)   SOC and Avalanches in MFE

B.)   Introduction to Gyrokinetics

  a.)   Basic Ideas
  b.)   Formulation
  c.)   Nonlinear GK Eqn.
  d.)   Basic Instabilities via GK
  e.)   Nonlinear Processes in GK

C.)   Wave Turbulence

    i.)   Wave Kinetics, Hasselman Equation
    ii.)   Manly-Rowe Relations
    iii.) Equilibrium ranges, spectra
    iv.) Non-local Interactions
    v.)   Lighthill criterion and NLS as a general paradigm
    vi.) Collapse
    vii.) Intermittency in Wave Turbulence

D.)   Nonlinear Wave-Particle Interaction

    i.)   Higher order mean field theory
    ii.)   Resonance broadening and shear dispersion
    iii.) Granulations, Holes, Double Layers
    iv.) Representing Non-Gaussian scattering