INTRODUCTION (01)

I Main Topics
   A Engineers, Geologists, & Society
   B Approach to Engineering Geology
   C Importance of case histories
   D Mechanics

II Engineers, Geologists, & Society
   A Engineers
      a Solve problems
      b Quantitative analysis emphasized
      c Models often simplified/simplistic
   B Geologists
      a Study problems
      b Qualitative analysis emphasized (traditionally)
      c See earth as complex (heterogeneous & anisotropic)
   C Society
      a Pays the bills for problems and regulates response
      b Confused by conflicting analyses
      c Sees geologists and engineers as mysterious

III Approach to Engineering Geology
   A Hazard Recognition (Regional & site-specific)
      1 Hazard = condition, process, or potential event that poses a threat to personal or economic health, safety, or welfare
      2 Province of geologist
   B Hazard Characterization (Regional & site-specific)
      1 Characterization: thorough description of system state & history
         a What are the essential (and/or recurring) features/processes?
         b Where are the features? (Geometry)
         c What are their engineering and hydrologic properties?
         d When did the geologic feature (structure/rock/deposit) form?
      2 Province of geologist & engineer
   C Risk Evaluation (Involves probabilities)
      1 Risk = function (product) of probability of occurrence and potential loss. Example: Teton Dam. \( R = (1.5 \times 10^{-4}/\text{yr})(7 \times 10^8) = 10^5/\text{yr} \)
      2 Province of geologist & engineer
D **Risk Assessment**
   1 Province of society at large
   2 **Is the level of risk tolerable?**

III Importance of case histories
   A Learn from the experience of others
   B What has happened can happen
   C Problems occur when all four of the above steps not executed
   D Don't ignore heterogeneity, discontinuities, and anisotropy
   E Demands vs. sufficiency of data often conflict
      1 Too little time
      2 Too little data (typical geologist's problem; exposures incomplete)
      3 Too much data
      4 Incorrect or inadequate data
   F Inadequate understanding of geologic processes \(\Rightarrow\) trouble
   G Investigators with different backgrounds see the same thing differently

IV Mechanics
   A **How do the processes operate?**
   B **What factors are important?**
   C Increasingly emphasized as part of quantitative analyses
   D **What are the assumptions in the analyses?**