Why Computational Science?

• How science and engineering is done
  – Models allow insights when systems are too large, too small, or too complex to fully understand through experimentation
  – Reduces time to solution for many types of research and design
  – Facilitates research that could not be done in any other way

• Now expanding to the use of digital resources in the humanities and social sciences
Computational Science Skills

• Computational science provides skills needed in the present and future workforce
  – Understanding of modeling techniques that are used in research and business
  – Data management skills
  – Analytical skills
  – Teamwork skills
  – Communications skills

• Inquiry-based education approach engages students in learning
Benefits to Students

• Inquiry-based learning is more effective than traditional lecture oriented instruction
  – Students are actively engaged in the learning process
  – Students gain deeper insights and have higher retention rates for the information
  – Facilitates the integration of information across academic disciplines – math, science, engineering, computer science, social science, and humanities
Goals for the Session

• Demonstrate the pedagogy for computational science education

• Progression of possible activities
  – Using complete models to demonstrate principles
  – Running models to gain insights into system behavior
  – Modifying models to relax assumptions
  – Building new models
What We Will Cover

• Introduce materials and models that can be incorporated for classroom use
• Introduce simple tools that can be used to build and demonstrate modeling techniques
• Provide example datasets and exercises
• Provide a list of resources you can explore in detail later
Getting Started

• Point your browser here:

  • https://www.osc.edu/~sgordon
    – Choose Workshop Materials
    – Then Links to other materials
Session Evaluation

Our reach will forever exceed our grasp, but, in stretching our horizon, we forever improve our world.