Summary of Physics I
Fall 2007

Course Goals

1. I want to help you improve your quantitative literacy, problem solving skills, and mathematical confidence.
2. I want you to learn several big physics ideas: conservation of energy, momentum, and angular momentum; and Newton's Laws.
3. I want you to gain experience working effectively and solving problems in groups.

Big Ideas

1. Interactions transfer momentum. They do not create momentum.
2. In a closed system, momentum is conserved.
3. In a closed system, energy is conserved.
4. In a closed system, angular momentum is conserved.
5. Newton's Laws:
   (a) An object in motion will remain in motion unless acted upon by some force.
   (b) $\vec{F}_{\text{net}} = m\vec{a}$.
   (c) When two objects interact, the exert forces on each other that are equal in magnitude but opposite in direction.

Math and Problem Solving Techniques

1. General problem-solving skills
2. Algebra
3. Vectors and Trigonometry
4. Using units and dimensions to help analyze equations
5. Estimation

Specific Topics and Concepts

1. Conservation of momentum
2. Center of mass
3. Momentum transfer, impulse, force
4. Kinetic energy
5. Gravitational potential energy (two different forms)
6. Angular velocity, radians
7. Rotational kinetic energy, momentum of inertia
8. Kinetic energy transfer, dot product
9. Specific "heat"
10. Chemical bonds, latent "heat"
11. Power
12. Angular momentum, cross products, torque
13. Conservation of angular momentum
14. Newton's laws
15. Motion diagrams
16. Graphs of position, velocity, and acceleration
17. Free-body and net force diagrams
18. Statics

Some Statistics

1. Eighty-four homework problems
2. Two exams, sixteen problems total
3. Seven labs
4. Nineteen textbook chapters