# Topics for today:

* Basic physical quantities and measurement units.
  + Distance; displacement; length; wavelength: expressed in *meters* [m]
  + Time; duration; period: expressed in *seconds* [s]
  + Frequency: expressed in *hertz* [Hz]. (Frequency is the rate of oscillation [cycles/s]).
  + Speed; velocity: expressed in *meters per second* [m/s]
  + Acceleration: rate of change of speed, expressed in *meters per second per second* [m/s2]
  + Mass: expressed in *kilograms* [kg]
  + Force; weight: expressed in *newtons* [N]. (Force is mass times acceleration. The newton is kg·m / s2 ).
  + Pressure: expressed in *pascal* [Pa]. (Pressure is *force per area* [N/m2]).
  + Energy; work: expressed in *joules* [J]. (Energy is *force times distance* [kg·m2/s2]).
  + Power: expressed in *watts* [W]. (Power is the rate at which energy is used [J/s]).
* Unit “prefixes” for orders of magnitude
  + Nano: 10-9 (0.000 000 001)
  + Micro: 10-6 (0.000 001)
  + Milli: 10-3 (0.001)
  + Centi: 10-2 (0.01)
  + Kilo: 103 (1 000)
  + Mega: 106 (1 000 000)
  + Giga: 109 (1 000 000 000)
  + Tera: 1012 (1 000 000 000 000)
* Vibration in simple mass-spring systems.
  + A spring may be thought of as a helix of wire, like a suspension spring in the undercarriage of a truck, or it may be a taut string or stiff rod attached at one or both ends.
  + If we compress or stretch the spring, it responds by exerting a corresponding *restoring force* in the opposite direction, trying to spring back to its original position. The amount of force is proportional to the amount of compression or extension. If we compress by an amount x, the force is – *k* x, where k is the “spring constant” and the negative sign indicates the force is in opposition to the direction of displacement.

Spring force = - *k* x

* + The units of the spring constant, k, are newtons per meter [N/m]. Different springs will have different spring constants. A very stiff spring has a large k, and a weaker spring has a small k.

# Topics for the next lecture:

* More on simple mass-spring vibration systems.
* Reading Assignment: Read chapter 4 from the Strong textbook.