Physics 111 - Lecture 6
Dynamics, Newton's Laws (Summary)

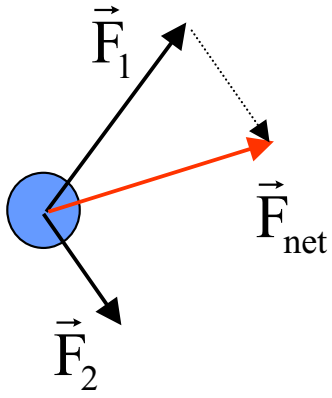
- Dynamics deals with why objects move as they do

- The Concept of FORCE

  - Forces are Vectors
  - Contact Forces: push, pull
  - Forces at a distance: gravity, electromagetic

- The NET FORCE on a body is the vector sum of all forces acting on the body

$$\vec{F}_{net} = \sum_i \vec{F}_i = \vec{F}_1 + \vec{F}_2 + \vec{F}_3 + \cdots$$



- No net force is required to keep a body in motion with constant velocity (Galileo)

- There is no difference between the state of rest and the state of uniform motion

Sir Issac Newton
1643-1727

Newton's First Law of Motion

Every body continues in a state of rest or uniform velocity unless it is compelled to change that state by a net force acting upon it.

- **Inertia of an object is its tendency to maintain its present state of motion.** ***Mass is a measure of Inertia.***

Newton's Second Law of Motion

Force is equal to mass time acceleration.

$$\vec{F}_{net} = m\,\vec{a} \quad \Rightarrow \quad \begin{aligned} F_{1x} + F_{2x} + \cdots &= m\,a_x \\ F_{1y} + F_{2y} + \cdots &= m\,a_y \\ F_{1z} + F_{2z} + \cdots &= m\,a_z \end{aligned}$$