EM 211 - STATICS

Fall AY07

Sections: 4003, 5002, 6001

Prof. Burkhandt

1. Introduction to Statics

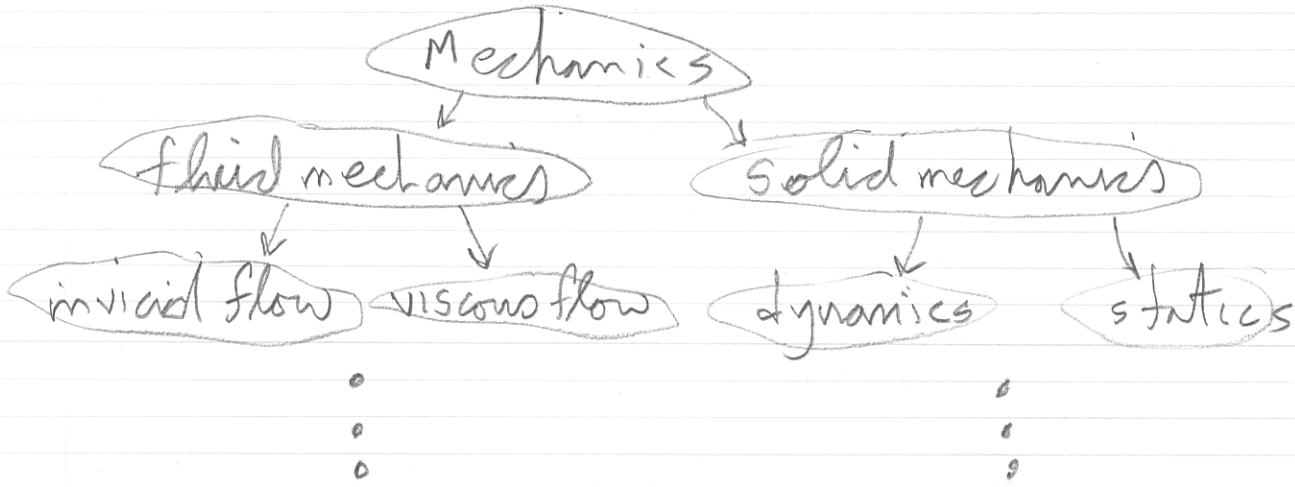
A. Mechanics

→ Deals with the effect of forces on objects

→ Plays a significant role in engineering

→ vibration, stability, strength, robotics, rockets, engines, fluid flow

→ Primary fields are solid mechanics and fluid mechanics



→ Mechanics covers much of what you will see as an engineering student

→ Oldest branch of the physical sciences
Archimedes (287 - 212 B.C.)

expressed in meters per second per second, or meters per second squared (m/s^2). In U.S. Customary units, the velocity is expressed in feet per second (ft/s) and the acceleration is expressed in feet per second squared (ft/s^2).

Newton's Laws

Elementary mechanics was established on a firm basis with the publication in 1687 of *Philosophiae naturalis principia mathematica*, by Isaac Newton. Although highly original, it built on fundamental concepts developed by many others during a long and difficult struggle toward understanding (Fig. 12.1).

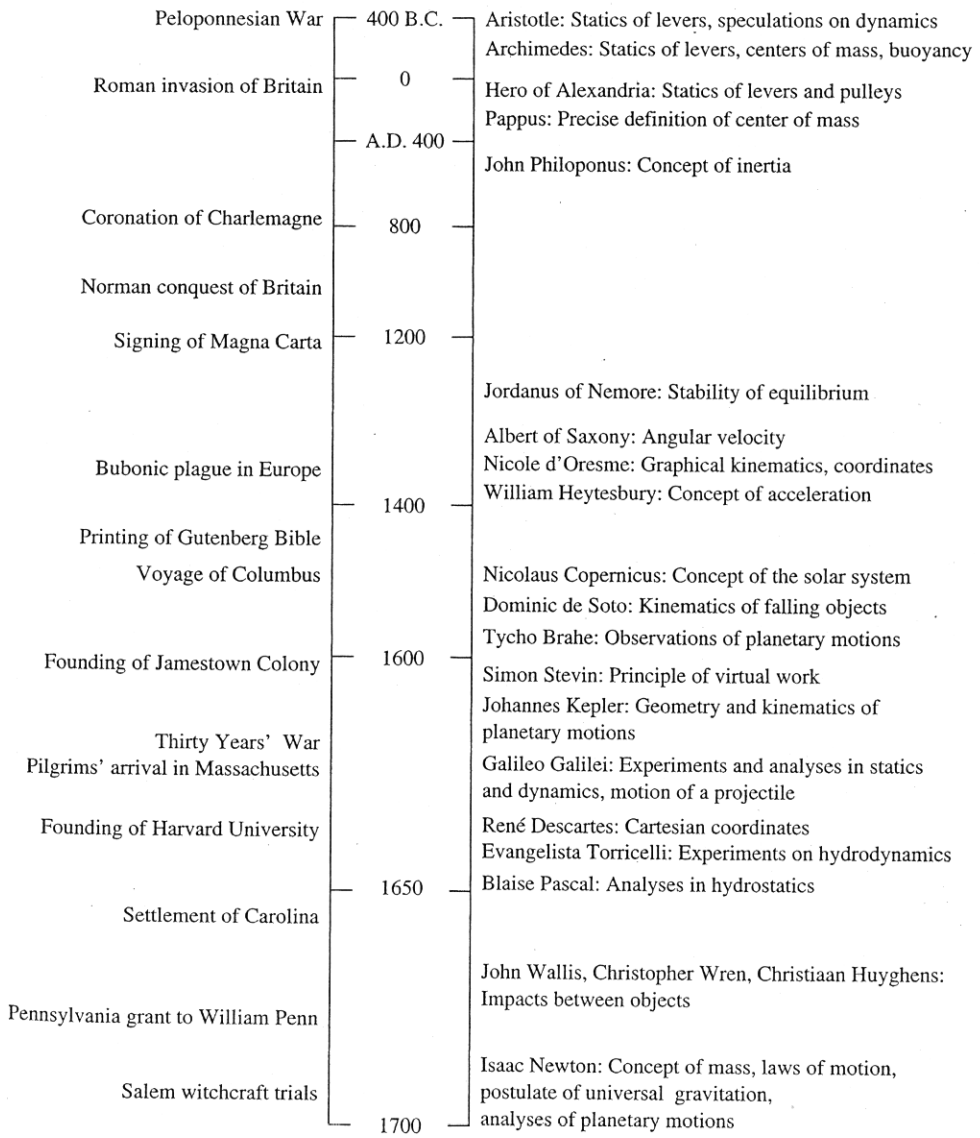


Figure 12.1
Chronology of developments in mechanics up to the publication of Newton's *Principia* in relation to other events in history.

B. Basic Concepts

space -

time -

mass -

force - the action of one body on another
- characterized by a magnitude and direction

particle - a body of negligible dimension
- a matter of scale - electron? / Proton collision
- aircraft at a distance - 747 / 50 km?

rigid body - A body where the distance between any two points remains largely unchanged. Bowling Ball?