

# LECTURE 2 version 1

## Takeaways:

drag - FORCE against  
an object in a flow

Viscosity - Force - deformation  
- thickness  
- resistance to flow

$$\tau_{yz} = \mu \frac{dv_z}{dy}$$

Turbulence goes w/ high momentum  
(hard but do-able)

Boundary Layers - near wall  
- free stream

# LECTURE 2 version 2

## Takeaways:

① Viscosity  
*material property*  
FLUID Behavior

Hagen Poiseuille

$$Q = \frac{R^4 \Delta P \pi}{8 \mu L}$$

② Drag

$$\Rightarrow f = \frac{16}{Re}$$

③ BL

$$Re = \frac{\rho V D}{\mu}$$

④ Laminar vs. Turbulence

Newton's Law

$$\tau_{xy} = \mu \frac{dv_x}{dy}$$