**MAE 303 – Mechanics of Fluids – Chapter 1-Definitions of Some Important Terms**

1. fluid – a material that deforms initially under an applied shear stress and continuously deforms **(liquids or gases)**
2. solid – a material that deforms initially under an applied shear stress, but does not continuously deform, it will eventually fail
3. fluid mechanics – the study of fluids and the forces acting on them and on the boundary layer it contacts
4. fluid statics – study of fluids at rest
5. fluid dynamics – study of fluids in motion
6. incompressible fluid – constant density fluids
7. compressible fluid – variable density fluids
8. compressible flow – flow of a gas at M > 0.3
9. Mach number – local speed of fluid/local speed of sound
10. speed of sound = √(γ RT) = 343 m/s under standard conditions
11. R – ideal gas constant
12. T – absolute kelvin temperature
13. γ – ratio of specific heats (in thermo) but in fluids it’s specific weight = ρ g
14. cp – constant pressure specific heat
15. cv – constant volume specific heat
16. specific weight – weight of fluid per unit volume = ρ g
17. specific gravity – ratio of fluid density to density of water
18. subsonic flow – M < 1
19. sonic flow – M = 1
20. transonic flow – 0.8 ≤ M ≤ 1.2
21. supersonic flow – M > 1
22. hypersonic flow – M > 6 **(≥)**
23. viscosity – properties of fluid that give fluids their ability to flow
    1. dynamic viscosity (μ) units = N-m/s^2 (for Newtonian fluids)
    2. kinematic viscosity (ν=μ/ρ) units = m^2/s (for fluids in motion)
24. inviscid fluid – fluids where there are no viscous forces
25. viscous fluid – fluids where there is a finite value of viscous forces and FRICTION IS IMPORTANT
26. Newtonian fluid – fluids where shear stress ∝ velocity gradient (μ=proportionality factor)
27. non-Newtonian fluid – fluids where shear stress is nonlinear with velocity gradient
28. steady flow – flow where fluid physical characteristics do NOT depend on time
29. unsteady flow – flow where fluid physical characteristics DO depend on time
30. laminar flow – flow where fluid physical parameters are steady over time and mass diffusion normal to the flow is negligible
31. turbulent flow – flow where fluid physical parameters are NOT steady over time and there is appreciable mass diffusion normal to the flow.
32. d’Alembert’s Paradox – experiment where there was an inviscous fluid assumption and there was a finite drag measured anyways.