Fluids Lecture Summary

Week	Index	Date	Short Title	Description	Readings C&C Ref
1	1	30-Jan-18	Introduction	Introduction; Continuum ; Density and Specific Gravity; Density of Ideal Gases	2-1; 2-2
	2	31-Jan-18	Compressibility	Compressibility & The Speed of Sound; Coefficient of Compressibility; Coefficient of Volume Expansion; Speed of sound and Mach number; Viscosity	2-5; 2-6
	HERE THEY START THE FLOW VIZ & DENSITY LABS				
	3	01-Feb-18	Pressure	**CHAPTER THREE; PRESSURE AND FLUID STATICS;** Pressure; Pressure at a Point ; Variation of Pressure with Depth	3-1
	4	02-Feb-18	Pressure Measurement	Pressure Measurement Devices; The Barometer; The Manometer; Other Pressure Measurement Devices	3-2
2	5	06-Feb-18	Hydrostatics	Introduction to Fluid Statics; Hydrostatic Forces on Submerged Plane Surfaces; Special Case: Submerged Rectangular Plate; Hydrostatic Forces on Submerged Curved Surfaces	3-3; 3-4; 3-5
	6	07-Feb-18	Bouyancy	Buoyancy and Stability; Stability of Immersed and Floating Bodies	3-6
	7	08-Feb-18	Fluid Kinematics	**CHAPTER FOUR; FLUID KINEMATICS;** Fundamentals of Flow Visualization; Streamlines and Streamtubes ; Pathlines ; Streaklines; Timelines ; Refractive Flow Visualization Techniques ; Surface Flow Visualization Techniques	4-2
	8	09-Feb-18	Fluid Kinematics	Plots of Fluid Flow Data; Profile Plots; Vector Plots ; Contour Plots	4-3
	BY HERE THEY HAVE COMPLETED THE FLOW VIZ AND DENSITY LABS				
	HERE THEY START THE FREIGHTER LAB				
3	9	13-Feb-18	Drag	**CHAPTER ELEVEN; EXTERNAL FLOW: DRAG AND LIFT;** Introduction; Drag and Lift; Friction and Pressure Drag; Reducing Drag by Streamlining ; Flow Separation	11-1; 11-2; 11-3
	10	14-Feb-18	Drag Coefficients	Drag Coefficients of Common Geometries; Biological Systems and Drag ; Drag Coefficients of Vehicles ; Superposition	11-4
	11	15-Feb-18	Friction	Parallel Flow over Flat Plates; Friction Coefficient ; ~~Flow over Cylinders and Spheres~~; Effect of Surface Roughness	11-5; 11-6
	12	16-Feb-18	Lift	Lift; ~~Finite-Span wings and Induced Drag ;~~ Lift Generated by Spinning; ~~Flying in Nature~~	11-7
	BY HERE THEY HAVE COMPLETED THE FREIGHTER LAB				
4		READING WEEK			
5	13	27-Feb-18	Conservation	**CHAPTER FIVE; BERNOULLI, AND ENERGY EQUATIONS;** Introduction; Conservation of Mass ; Conservation of Momentum; Conservation of Energy	5-1
	14	28-Feb-18	Conservation of Mass	Conservation of Mass; Mass and Volume Flow Rates ; Conservation of Mass Principle ; Moving or Deforming Control Volumes ; Mass Balance for Steady-Flow Processes ; Special Case: Incompressible Flow	5-2
	15	01-Mar-18	Bernoulli	Mechanical Energy and Efficiency; The Bernoulli Equation; Acceleration of a Fluid Particle ; Derivation of the Bernoulli Equation ; Force Balance across Streamlines ; Unsteady, Compressible Flow ; Static, Dynamic, and Stagnation Pressures ; Limitations on the Use of the Bernoulli Equation ; Hydraulic Grade Line (HGL) and Energy Grade Line (EGL) ; Applications of the Bernoulli Equation	5-3; 5-4

	16	02-Mar-18	Conservation of Momentum	**CHAPTER SIX; MOMENTUM ANALYSIS OF FLOW SYSTEMS;** Newton's Laws and Conservation of Momentum; Choosing a Control Volume	6-1; 6-2
6	17	06-Mar-18	Forces on a CV	Forces Acting on a Control Volume; The Linear Momentum Equation; Special Cases; Momentum-flux correction factor; Steady Flow; Flow with no external forces	6-3; 6-4
	18	07-Mar-18	Angular Momentum	Review of Rotational Motion and Angular Momentum; The Angular Momentum Equation; Special Cases; Flow with no External Moments; Radial-Flow devices	6-5; 6-6
	19	08-Mar-18	Dimensional Analysis	**CHAPTER SEVEN; DIMENSIONAL ANALYSIS AND MODELING;** Dimensions and Units; Dimensional Homogeneity; Nondimensionalization of Equations 272	7-1; 7-2
	20	09-Mar-18	Similitude	Dimensional Analysis and Similarity; The Method of Repeating Variables and the Buckingham Pi Theorem; Historical Spotlight: Persons Honored by Nondimensional Parameters; Experimental Testing and Incomplete Similarity; Setup of an Experiment and Correlation of Experimental Data 297; Incomplete Similarity 298 ; Wind Tunnel Testing 298 ; Flows with Free Surfaces 301; Application Spotlight: How a Fly Flies	7-3; 7-4; 7-5
	HERE THEY START THE PUMP LOOP & BERNOULLI LABS				
7	21	13-Mar-18	Internal Flow	**CHAPTER EIGHT; INTERNAL FLOW;** Introduction; Laminar and Turbulent Flows; Reynolds Number; The Entrance Region; Entry Lengths	8-1; 8-2; 8-3
	22	14-Mar-18	Losses & Pressure Drop	Laminar Flow in Pipes; Pressure Drop and Head Loss; Effect of Gravity on Velocity and Flow Rate in Laminar Flow; Laminar Flow in Noncircular Pipes	8-4
	23	15-Mar-18	Turbulent flow	Turbulent Flow in Pipes; Turbulent Shear Stress; Turbulent Velocity Profile; The Moody Chart	8-5
	24	16-Mar-18	Minor Losses	Types of Fluid Flow Problems ; Minor Losses; Piping Networks and Pump Selection	8-6; 8-7
8	25	20-Mar-18	Pump types	**CHAPTER FOURTEEN; TURBOMACHINERY;** Classifications and Terminology; Pumps	14-1; 14-2
	26	21-Mar-18	Pump characteristics	Pump Performance Curves and Matching a Pump to a Piping System; Pump Cavitation and NPSH; Pumps in series and in parallel; Positive-Displacement Pumps; Dynamic pumps	
	27	22-Mar-18	Pumps	Centrifugal pumps; Axial pumps	
	28	23-Mar-18	Pump Scaling	Pump Scaling Laws; Dimensional Analysis; Pump Specific Speed; Affinity Laws	14-3
	BY HERE THEY HAVE COMPLETED THE PUMP LOOP & BERNOULLI LABS				
	29	27-Mar-18	Review		
	30	28-Mar-18	Review		