



UNIVERSITI TEKNOLOGI MARA

CMT255: FLUID MECHANICS

Course Name (English)	FLUID MECHANICS APPROVED
Course Code	CMT255
MQF Credit	3
Course Description	This course will introduce students to the basic concepts as well as the applications of the three main principles of fluid mechanics which are fluid statics, fluid kinematics and fluid dynamics. The topics that will be covered are properties of fluid, pressure measurements and devices, types of fluid flow, the application of Bernoulli's equation in various fluid flow measurement devices, flow measurement over notches and weirs and pipe flow measurement through fittings and pump.
Transferable Skills	Demonstrate analytical skills on the operation of some basic fluid mechanics apparatus/machines
Teaching Methodologies	Lectures, Blended Learning, Lab Work, Tutorial
CLO	<p>CLO1 Describe and explain the basic operation of some pressure and fluid flow measurement devices.</p> <p>CLO2 Relate the concepts and laws in fluid mechanics to solve quantitative problems visually and mathematically.</p> <p>CLO3 Carry out laboratory experiments on fluid mechanics and report experimental findings to standard format.</p>
Pre-Requisite Courses	No course recommendations
Topics	
<p>1. Introduction to Fluid Mechanics</p> <p>1.1) Principles of fluid mechanics (Fluid statics, Fluid kinematics & Fluid dynamics)</p> <p>1.2) Differences between fluid and solid, and fluid mechanics and solid mechanics</p> <p>1.3) Types of fluids</p> <p>1.4) Properties of fluids (Density, Specific volume, Specific weight, Specific gravity, Viscosity and Surface tension)</p>	
<p>2. Fluid Statics</p> <p>2.1) Fluid pressure at a point</p> <p>2.2) Pascal's law</p> <p>2.3) Pressure due to elevation</p> <p>2.4) Relationship of pressure (absolute, atmospheric, gauge and vacuum pressures)</p> <p>2.5) Mechanical and electronic pressure measurement devices – description and principle operation</p> <p>2.6) Manometry – piezometer tube, u-tube manometer, inverted u-tube manometer and inclined manometer</p>	
<p>3. Fluid Kinematics</p> <p>3.1) Fundamentals of flow visualisation (streamlines, pathlines, streamtubes & streaklines).</p> <p>3.2) Classification of fluid flows (Steady flow & Unsteady flows, Uniform & Non uniform flows, Compressible & Incompressible flows, Laminar & Turbulent flows, Rotational & Irrotational flows and One, Two & Three-Dimensional flows)</p> <p>3.3) Discharge and Continuity equations</p> <p>3.4) Reynolds number (RN)</p>	
<p>4. Fluid Dynamics</p> <p>4.1) Newton's second law</p> <p>4.2) Definition & description of Bernoulli's equation</p> <p>4.3) Principle operation of venturimeter, orifice meter, pitot tube, siphon and sharp-edged orifice</p> <p>4.4) Calculations involving Bernoulli equation in venturimeter, orifice meter, pitot tube, siphon and sharp-edged orifice</p>	

5. Flow in Open Channel - Notch and Weir

- 5.1) Introduction to notch and weir
- 5.2) Flow measurement in rectangular notch and weir (General flow equation, Francis formula, Effects of end contraction and velocity of approach)
- 5.3) Flow measurement in triangular and trapezoidal notch and weir
- 5.4) Ventilation over the rectangular weirs

6. Pipe Flow Measurement

- 6.1) Hagen Poiseuille's law for viscous flow
- 6.2) Distribution of velocity over a pipe section
- 6.3) Darcy-Weisbach formula for head loss due to frictional resistance
- 6.4) Friction factor chart
- 6.5) Calculation of head loss due to fittings
- 6.6) Flow through pump – Calculation of head develop, power input, power output and pump efficiency

Assessment Breakdown	%
Continuous Assessment	100.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Assignment on pressure and fluid flow devices	30%	CLO1
	Practical	Lab report on fluid mechanics laboratory practicals	20%	CLO3
	Test	Test 1 will covered chapters 1, 2 and 3	25%	CLO2
	Test	Test 2 will covered chapter 4, 5 and 6	25%	CLO2

Reading List	Reference Book Resources
	<ul style="list-style-type: none"> • Robert W.F., Alan T.M. and Philip J.P. 2008, <i>Introduction to Fluid Mechanics</i> • Bansal R. K. 2008, <i>A Textbook of Fluid Mechanics and Hydraulic Machines</i> • David C. Wiggert, Bassem and H. Ramadan 2012, <i>Mechanics of Fluids – SI edition</i>

Article/Paper List	
	This Course does not have any article/paper resources

Other References	
	This Course does not have any other resources