COURSE OUTLINE: MCH125 - MECHANICS OF FLUIDS

Prepared: Howard Gray
Approved: Corey Meunier, Chair, Technology and Skilled Trades

Course Code: Title	MCH125: MECHANICS OF FLUIDS
Program Number: Name	4039: MECH. ENG. TN-MANUFA
Department:	MECHANICAL TECHNIQUES PS
Semesters/Terms:	21W
Course Description:	This course is an introduction to fluids their properties and coherent units of measurement, pressure, vapour pressure, vacuum, Pascal`s Law with an emphasis on pressure measuring devices, buoyancy, Bernoulli`s equation, flow of fluids, velocity and flow measuring instruments.
Total Credits:	3
Hours/Week:	4
Total Hours:	60
Prerequisites:	MCH258, MTH143
Corequisites:	There are no co-requisites for this course.
This course is a pre-requisite for:	MCH506
Vocational Learning Outcomes (VLO's) addressed in this course: **Please refer to program web page for a complete listing of program outcomes where applicable.**	**4039 - MECH. ENG. TN-MANUFA** VLO 6 Analyze and solve mechanical problems by applying mathematics and fundamentals of mechanical engineering.
Essential Employability Skills (EES) addressed in this course:	EES 1 Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience. EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication. EES 3 Execute mathematical operations accurately. EES 4 Apply a systematic approach to solve problems. EES 5 Use a variety of thinking skills to anticipate and solve problems. EES 7 Analyze, evaluate, and apply relevant information from a variety of sources. EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others. EES 10 Manage the use of time and other resources to complete projects. EES 11 Take responsibility for ones own actions, decisions, and consequences.
Course Evaluation:	Passing Grade: 50%,

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2020-2021 academic year.

A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.

Books and Required Resources:

Applied Fluid Mechanics (7th Ed). by Robert Mott and Joseph A Untener
Publisher: Prentice Hall Edition: 7th

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
1 Introduction To Fluid Mechanics/Fluid Properties	1.1 • Demonstrate an understanding of unit conversions related to fluids, extensive and intensive properties, homogeneous and non-homogeneous fluids and fluid characteristics such as: 1.1 a. Unit Conversions related to fluids 1.1 b. Extensive and intensive properties of fluids 1.1 c. Homogeneous and non-homogeneous fluids 1.1 d. Properties and characteristics of fluids such as mass / weight, flow of heat, viscosity, surface tension, vapour pressure and elasticity
Course Outcome 2	**Learning Objectives for Course Outcome 2**
2. Fluid Statics	2.1 Define and calculate pressure, absolute, gauge and vacuum 2.2 Analyze pressure variation with elevation 2.3 Utilize the basic differential equation (equation of equilibrium) to solve complex problems 2.4 Demonstrate an understanding of uniform density 2.5 Demonstrate an understanding of the characteristics of compressible fluids and solve related problems 2.6 Utilize manometers and other pressure measuring devices (Bourdon/Strain/Quartz gauges) and have a full understanding of how these devices work 2.7 Illustrate understanding of hydrostatic forces on both plane and curved surfaces 2.8 Demonstrate an understanding of Buoyancy and Stability of Immersed and Floating Bodies
Course Outcome 3	**Learning Objectives for Course Outcome 3**
3 Fluids in Motion	3.1 Define and understand velocity and flow including concepts such as Lagrangian and Eulerian viewpoints, streamlines and flow patterns, laminar and turbulent flow 3.2 Utilize alternate methods to develop flow patterns: Analytical, Numerical and Experimental 3.3 Define and illustrate understanding of volume rate of flow, as well as mean and average velocity 3.4 Explain the concept of acceleration including normal and tangential components, Cartesian components, convective and local acceleration 3.5 Define system, control volume and control surface in reference to the basic control volume approach 3.6 Identify and differentiate between extensive and intensive properties 3.7 Derive the control volume equations and illustrate

		understanding of the control volume equation for steady state flow 3.8 Explain and utilize the general form of the continuity equation and the continuity equation for steady one dimensional flow in a conduit 3.9 Explain the concept of rotation and vortices
	Course Outcome 4	**Learning Objectives for Course Outcome 4**
	4 Pressure Variation in Flowing Fluids	4.1 Explain the basic causes of pressure variation in a flowing fluid using examples that include pressure variation due to weight and acceleration 4.2 Illustrate understanding and application of the Bernoulli Equation along a streamline and for irrotational flow 4.3 Demonstrate problem solving skills utilizing the Bernoulli equation for complex problems
	Course Outcome 5	**Learning Objectives for Course Outcome 5**
	5 Momentum Principle	5.1 Derive and Utilize the momentum equation 5.2 Illustrate the ability to interpret the momentum equation including the force terms, momentum accumulation, momentum flow, momentum diagrams 5.3 Utilize the momentum equation for Cartesian coordinates 5.4 Explain and demonstrate knowledge of the systematic approach 5.5 Explain typical applications such as fluid jets, nozzles, vanes and pipes

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Final Exam	30%
Home/Labwork, Attendance	20%
Quiz	10%
Term test 1	20%
Term test 2	20%

Date: September 2, 2020

Addendum: Please refer to the course outline addendum on the Learning Management System for further information.

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2020-2021 academic year.