



## COURSE OUTLINE: ELR211 - FLUIDS & COMBUSTION

Prepared: Randy Clouthier

Approved: Corey Meunier, Chair, Technology and Skilled Trades

<b>Course Code: Title</b>	ELR211: FLUIDS & COMBUSTION
<b>Program Number: Name</b>	4104: INST CONTROL ENG TN
<b>Department:</b>	ELECT./INSTRUMENTATION PS
<b>Semesters/Terms:</b>	20F
<b>Course Description:</b>	This course includes the study of viscosity, pressure, temperature, gas laws, pressure at a depth, manometry, continuity equation, Bernoulli's equation, pitot tubes, orifice and venturi meters, laminar and turbulent flow, combustion and properties of steam.
<b>Total Credits:</b>	5
<b>Hours/Week:</b>	3
<b>Total Hours:</b>	45
<b>Prerequisites:</b>	There are no pre-requisites for this course.
<b>Corequisites:</b>	There are no co-requisites for this course.
<b>Essential Employability Skills (EES) addressed in this course:</b>	<p>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.</p> <p>EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication.</p> <p>EES 3 Execute mathematical operations accurately.</p> <p>EES 4 Apply a systematic approach to solve problems.</p> <p>EES 5 Use a variety of thinking skills to anticipate and solve problems.</p> <p>EES 6 Locate, select, organize, and document information using appropriate technology and information systems.</p> <p>EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.</p> <p>EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others.</p> <p>EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.</p> <p>EES 10 Manage the use of time and other resources to complete projects.</p> <p>EES 11 Take responsibility for ones own actions, decisions, and consequences.</p>
<b>Course Evaluation:</b>	<p>Passing Grade: 50%, D</p> <p>A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.</p>
<b>Other Course Evaluation &amp; Assessment Requirements:</b>	<p>Grade Definition Grade Point Equivalent</p>

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.



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A+ 90 - 100% 4.00  
 A 80 - 89%  
 B 70 - 79% 3.00  
 C 60 - 69% 2.00  
 D 50 - 59% 1.00  
 F (Fail) 49% and below 0.00

CR (Credit) Credit for diploma requirements has been awarded.  
 S Satisfactory achievement in field /clinical placement or non-graded subject area.  
 U Unsatisfactory achievement in field/clinical placement or non-graded subject area.  
 X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.  
 NR Grade not reported to Registrar's office.  
 W Student has withdrawn from the course without academic penalty.

**Course Outcomes and Learning Objectives:**

<b>Course Outcome 1</b>	<b>Learning Objectives for Course Outcome 1</b>
Define, express and relate the properties of fluids	Define the terms fluids and fluid mechanics - Derive units of force, energy and pressure in SI and English - Perform unit conversions - Select the appropriate significant figures - Define the term density, weight density and specific gravity - Derive the relationship between mass density and weight density - Express pressure as equivalent liquid column - Differentiate between gauge pressure and absolute pressure - Explain the role of viscosity in fluid flow
<b>Course Outcome 2</b>	<b>Learning Objectives for Course Outcome 2</b>
Describe the behavior of fluids at rest	Discuss the different forms of fluid energy - Express the fluid energy as head - Derive the relationships between pressure and elevation - Measure fluid pressure using manometers and gauges - Calculate the forces acting on retaining walls and buoyant forces on bodies immersed in fluids
<b>Course Outcome 3</b>	<b>Learning Objectives for Course Outcome 3</b>
Apply the principles of mass conservation and energy conservation to fluids in motion	Derive and apply continuity equation to size the pipes - Apply the concept of energy conservation to write Bernoulli's equation - Recognize the limitations of Bernoulli's equation - Define Toricelli's theorem - Describe the working principles of variable head meters
<b>Course Outcome 4</b>	<b>Learning Objectives for Course Outcome 4</b>
Apply the principles of fluid mechanics to flow measurement	Identify hydraulic mechanics like pumps and turbines - Expand Bernoulli's equation to include the terms head added and head lost apply energy equation to solve practical problems - Calculate the power required to drive pumps - Derive general flow equation for variable head meter - Study a venturi meter in the laboratory - Calculate the velocity of flow using Pitot-static tube

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		<ul style="list-style-type: none"> <li>- Characterize laminar flow and turbulent flow</li> <li>- Compute frictional head loss</li> <li>- Calculate total losses and use this in the general energy equation</li> </ul>
	<b>Course Outcome 5</b>	<b>Learning Objectives for Course Outcome 5</b>
	Describe the Products of Combustion	Define Combustion and its properties <ul style="list-style-type: none"> <li>- Fuels</li> <li>- Molecular structure of fuels</li> <li>- Write balanced Combustion equations</li> <li>- Describe Stoichiometric Ratio</li> <li>- Describe heating Value of Fuels</li> </ul>
	<b>Course Outcome 6</b>	<b>Learning Objectives for Course Outcome 6</b>
	Describe Flue gases and Flue gases Analyses	Describe the products of Combustion <ul style="list-style-type: none"> <li>- Boiler efficiency and Excess Air</li> </ul>

**Evaluation Process and Grading System:**

Evaluation Type	Evaluation Weight
Assingments and quizzes	10%
Labs	20%
Written Tests	70%

**Date:** September 2, 2020

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

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