COURSE OUTLINE: ELR211 - FLUIDS & COMBUSTION

Prepared: Randy Clouthier
Approved: Corey Meunier, Dean, Technology, Trades, and Apprenticeship

Course Code: Title	ELR211: FLUIDS & COMBUSTION
Program Number: Name	4029: ELECTRICAL TY-PROCES
Department:	ELECT./INSTRUMENTATION PS
Academic Year:	2024-2025
Course Description:	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.
Total Credits:	5
Hours/Week:	3
Total Hours:	42
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
Vocational Learning Outcomes (VLO's) addressed in this course: **Please refer to program web page for a complete listing of program outcomes where applicable.**	**4029 - ELECTRICAL TY-PROCES** VLO 1 Analyze, interpret, and produce electrical and electronics drawings, technical reports including other related documents and graphics. VLO 2 Analyze and solve complex technical problems related to electrical systems by applying mathematics and science principles. VLO 3 Design, use, verify, and maintain instrumentation equipment and systems. VLO 4 Design, assemble, test, modify, maintain and commission electrical equipment and systems to fulfill requirements and specifications under the supervision of a qualified person. VLO 6 Design, assemble, analyze, and troubleshoot electrical and electronic circuits, components, equipment and systems under the supervision of a qualified person. VLO 7 Design, install, analyze, assemble and troubleshoot control systems under the supervision of a qualified person. VLO 8 Use computer skills and tools to solve a range of electrical related problems. VLO 9 Create, conduct and recommend modifications to quality assurance procedures under the supervision of a qualified person. VLO 10 Prepare reports and maintain records and documentation systems. VLO 12 Apply and monitor health and safety standards and best practices to workplaces. VLO 14 Configure installation and apply electrical cabling requirements and system grounding and bonding requirements for a variety of applications under the supervision of a qualified person.
Essential Employability Skills (EES) addressed in	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.

this course:	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 6 Locate, select, organize, and document information using appropriate technology and information systems. 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 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals. 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%, D A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.
Other Course Evaluation & Assessment Requirements:	Smart watches, smart phones and similar devices are not allowed during tests or quizzes and must be removed. Smart phones are not acceptable for use as a calculator during a test or quiz. Grade Definition Grade Point Equivalent 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:	

Course Outcome 1	**Learning Objectives for Course Outcome 1**
1. Define, express, and relate the properties of fluids.	1.1 Define the terms fluids and fluid mechanics. 1.2 Derive units of force, energy and pressure in SI and English. 1.3 Perform unit conversions and select appropriate significant figures. 1.4 Define the term density, weight density and specific gravity. 1.5 Derive the relationship between mass density and weight

	density. 1.6 Express pressure as equivalent liquid column. 1.7 Differentiate between gauge pressure and absolute pressure. 1.8 Explain the role of viscosity in fluid flow.
Course Outcome 2	**Learning Objectives for Course Outcome 2**
2. Describe the behavior of fluids at rest.	2.1 Discuss the different forms of fluid energy. 2.2 Express the fluid energy as head. 2.3 Derive the relationships between pressure and elevation. 2.4 Measure fluid pressure using manometers and gauges. 2.5 Calculate the forces acting on retaining walls and buoyant forces on bodies immersed in fluids.
Course Outcome 3	**Learning Objectives for Course Outcome 3**
3. Apply the principles of mass conservation and energy conservation to fluids in motion.	3.1 Derive and apply continuity equation to size the pipes. 3.2 Apply the concept of energy conversation to write Bernoulli`s equation. 3.3 Recognize the limitations of Bernoulli`s equation. 3.4 Define Toricelli`s theorem. 3.5 Describe the working principles of variable head meters.
Course Outcome 4	**Learning Objectives for Course Outcome 4**
4. Apply the principles of fluid mechanics to flow measurement.	4.1 Identify hydraulic mechanics such as pumps and turbines. 4.2 Expand Bernoulli`s equation to include the terms head added and head lost apply energy equation to solve practical problems. 4.3 Calculate the power required to drive pumps. 4.4 Derive general flow equation for variable head meter. 4.5 Study a venturi meter in the laboratory. 4.6 Calculate the velocity of flow using Pitot-static tube. 4.7 Characterize laminar flow and turbulent flow. 4.8 Compute frictional head loss. 4.9 Calculate total losses and use this in the general energy equation.
Course Outcome 5	**Learning Objectives for Course Outcome 5**
5. Describe the products of combustion, flue gasses and flue gas analysis.	5.1 Define Combustion and its properties. 5.2 Describe fuels and the molecular structure of fuels. 5.3 Write balanced Combustion equations. 5.4 Describe Stoichiometric Ratio. 5.5 Describe heating Value of Fuels. 5.6 Understand boiler efficiency and excess air.

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Assignments and Quizzes	10%
Labs	20%
Written Tests	70%

Date: August 9, 2024

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