



# COURSE OUTLINE

## ELR211

Prepared: Frank Musso    Approved: Corey Meunier

<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>Semester/Term:</b>	17F
<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>Essential Employability Skills (EES):</b>	<p>#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>#2. Respond to written, spoken, or visual messages in a manner that ensures effective communication.</p> <p>#3. Execute mathematical operations accurately.</p> <p>#4. Apply a systematic approach to solve problems.</p> <p>#5. Use a variety of thinking skills to anticipate and solve problems.</p> <p>#6. Locate, select, organize, and document information using appropriate technology and information systems.</p> <p>#7. Analyze, evaluate, and apply relevant information from a variety of sources.</p> <p>#8. Show respect for the diverse opinions, values, belief systems, and contributions of others.</p> <p>#9. Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.</p> <p>#10. Manage the use of time and other resources to complete projects.</p> <p>#11. Take responsibility for ones own actions, decisions, and consequences.</p>
<b>Course Evaluation:</b>	Passing Grade: 50%, D
<b>Other Course Evaluation &amp; Assessment Requirements:</b>	<p>Grade</p> <p>Definition Grade Point Equivalent</p> <p>A+ 90 – 100% 4.00</p> <p>A 80 – 89%</p> <p>B 70 - 79% 3.00</p>



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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.

**Evaluation Process and Grading System:**

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

**Course Outcomes and Learning Objectives:**

### Course Outcome 1.

Define, express and relate the properties of fluids

### Learning Objectives 1.

- 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 tem 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

### Course Outcome 2.

Describe the behavior of fluids at rest



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### **Learning Objectives 2.**

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

### **Course Outcome 3.**

Apply the principles of mass conservation and energy conservation to fluids in motion

### **Learning Objectives 3.**

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

### **Course Outcome 4.**

Apply the principles of fluid mechanics to flow measurement

### **Learning Objectives 4.**

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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- Characterize laminar flow and turbulent flow
- Compute frictional head loss
- Calculate total losses and use this in the general energy equation

### **Course Outcome 5.**

Describe the Products of Combustion

### **Learning Objectives 5.**

- Define Combustion and its properties
- Fuels
  - Molecular structure of fuels
  - Write balanced Combustion equations
  - Describe Stoichiometric Ratio
  - Describe heating Value of Fuels

### **Course Outcome 6.**

Describe Flue gases and Flue gases Analyses

### **Learning Objectives 6.**

- Describe the products of Combustion
- Boiler efficiency and Excess Air

**Date:**

Friday, September 1, 2017

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