STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
ENGS 314– FLUID MECHANICS I

Created by: Dr. Lucas Craig

Updated by:

Canino School of Engineering Technology

Department: Engineering Science

Semester/Year: Fall 2021

A. **TITLE**: Fluid Mechanics I

B. **COURSE NUMBER:** ENGS 314

C. **CREDIT HOURS: (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)**

 # Credit Hours: 3
 # Lecture Hours: 3 **per week**
 # Lab Hours: **per week**
Other: **per week**

Course Length: 15 **Weeks**

D. **WRITING INTENSIVE COURSE**: Yes ☐ No ☒

E. **GER CATEGORY: None:** ☒ **Yes:**
***If course satisfies more than one*:**

F. **SEMESTER(S) OFFERED: Fall** ☒ **Spring** ☐ **Fall & Spring** ☐

G. **COURSE DESCRIPTION:**

This course develops knowledge of fluid mechanics. Topics include properties of fluids, pressure, hydrostatic forces, fluid statics, Bernoulli's, and the energy equation are explored in respect to applications in the mechanical and civil industry. Flow rate, pipe sizing, and minor losses in piping systems are addressed.

H. **PRE-REQUISITES: None** ☒ **Yes** ☒ **If yes, list below:**

MATH 123, PHYS 121 or PHYS 131

CO-REQUISITES: None ☒ **Yes** ☐ **If yes, list below:**

I. STUDENT LEARNING OUTCOMES: (*see key below*)

By the end of this course, the student will be able to:

Course Student Learning Outcome [SLO]	***Program Student Learning Outcome [PSLO]***	***GER*** *[If Applicable]*	***ISLO & SUBSETS***	
Define fluid properties such as density, specific weight, dynamic viscosity, pressure, volume flow rate, and mass flow rate.	2488 – SO1 517 – SO1 493 – SO1 235 – SO1		2-Crit Think ISLO ISLO	PS Subsets Subsets Subsets
Define and analyze hydrostatic forces.	2488 – SO1 517 – SO1 493 – SO1 235 – SO1		2-Crit Think ISLO ISLO	PS Subsets Subsets Subsets
Determine Reynolds number and differentiate between laminar and turbulent flow.	2488 – SO1 517 – SO1 493 – SO1 235 – SO1		2-Crit Think ISLO ISLO	PS Subsets Subsets Subsets
Manipulate Pascal and Bernoulli's laws to solve basic fluid mechanic problems.	2488 – SO1 517 – SO1 493 – SO1 235 – SO1		2-Crit Think ISLO ISLO	PS Subsets Subsets Subsets
Calculate friction losses in pipes and fittings to apply in the modified Bernoulli's.	2488 – SO1 517 – SO1 493 – SO1 235 – SO1		2-Crit Think ISLO ISLO	PS Subsets Subsets Subsets
Size pumps, fans, and turbines, using the modified Bernoulli's equations.	2488 – SO2 517 – SO2 493 – SO2 235 – SO2		2-Crit Think ISLO ISLO	PS Subsets Subsets Subsets

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KEY	**Institutional Student Learning Outcomes [ISLO 1 – 5]**
ISLO #	**ISLO & Subsets**
1	**Communication Skills** Oral [O], Written [W]
2	**Critical Thinking** *Critical Analysis [CA] , Inquiry & Analysis [IA] , Problem Solving [PS]*
3	**Foundational Skills** *Information Management [IM], Quantitative Lit,/Reasoning [QTR]*
4	**Social Responsibility** *Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]*
5	**Industry, Professional, Discipline Specific Knowledge and Skills**

*Include program objectives if applicable. Please consult with Program Coordinator

J. **APPLIED LEARNING COMPONENT:** Yes ☒ No ☐

If YES, select one or more of the following categories:

- ☒ Classroom/Lab
- ☐ Internship
- ☐ Clinical Placement
- ☐ Practicum
- ☐ Service Learning
- ☐ Community Service

- ☐ Civic Engagement
- ☐ Creative Works/Senior Project
- ☐ Research
- ☐ Entrepreneurship

(program, class, project)

K. TEXTS:

Cengel, Yunus A. and Cimbala, John M., Fluid Mechanics 3e , McGraw-Hill 2014., ISBN: 9780073380322.

Or

Mott, R. Applied Fluid Mechanics (7th Edition). New York: Prentice Hall, 2014.

L. REFERENCES:

Gribbin, J.E. (2007). Introduction to Hydraulics and Hydrology, 3rd edition. Clifton Park, NY: Thomson Delmar Learning. ISBN: 1418032956.

M. EQUIPMENT: None ☒ Needed:

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

Homework, exams, projects

P. DETAILED COURSE OUTLINE:

I. Intro to Fluid Mechanics
- **A. Fluid as a liquid or gas**
- **B.**
- **C. Pascal's, Bernoulli's law (introduced)**

II. Properties of Fluids
- **A. Weight, Density, and Specific Gravity**
- **B. Force, Pressure, and Head**
- **C. Pascal's Law**
- **D. Bulk Modulus**
- **E. Viscosity**

III. Energy and Forces
- **A. Review Mechanics**
- **B. Pressures in liquids at rest**
- **C. Atmospheric Pressure**
- **D. Manometers**
- **E. Forces on plane surfaces**
- **F. Forces on inclined surfaces**
- **G. Buoyancy**
- **H. Bernoulli's Equations applications**

IV. Sizing pipes and ducts
- **A. Flow Rate**
- **B. Laminar flow and Turbulent flow**
- **C. Losses due to valves and fittings**
- **D. Compressible and Incompressible Flow**

V. Pump Sizing

- **A. Pumps**
- **B. Motors**
- **C. Horsepower and Efficiency**
- **D. Sizing Hydraulic Cylinders**

Q. <u>LABORATORY OUTLINE</u>: None ☒ Yes ☐