FLORIDA POLYTECHNIC UNIVERSITY	**EML 3015** **Fluid Mechanics**

Course Information

- **Course Number and Title**: EML3015 Fluid Mechanics (Sections 01 and 02)
- **Credit Hours:** 3 lecture/0 lab
- **Academic Term:** Spring 2026

Instructor Information

- **Instructor:** Caleb Traylor, PhD
- **Office Location:** BARC-1182
- **Office Hours**: M 1:00 PM – 2:00 PM, T 2:30 PM – 3:30 PM, W 11:00 AM – 12:00 PM, or by appointment.
- **Email address**: ctraylor@floridapoly.edu

Course Delivery and Course Description

- **Delivery Mode**: In-person attendance
- **Class Meeting Day, Time & Location:** Section 01: TR 9:30 AM – 10:45 AM, IST-1064
  Section 02: TR 11:00 AM – 12:15 PM, IST-1064
- **Course Website**: Canvas and Gradescope
- **Official Catalog Course Description**: The properties and behavior of fluids at rest and in motion are discussed in this course. Topics include fluid statics; transport theorem; flow of incompressible fluids; flow of real fluids in closed conduits, impulse and momentum; and fluid measurement.
  - **Course Prerequisites:** MAC 2313 - Analytic Geometry and Calculus 3 and (EGN 3321 Dynamics or ENV 2003 Foundations of Environmental Engineering or CGN 2002 - Introduction to Civil Engineering) and MAP 2302 Differential Equations
  - **Communication/Computation Skills Requirement (6A-10.030)**: No
- **Required Texts**:
  Fox and McDonald's Introduction to Fluid Mechanics, 10th Edition by J. W. Mitchell ©2020, ISBN-13: 978-1119721024; 9781119616498.
- **Equipment and Materials**: Canvas, PC/tablet with internet, Microsoft Office, Calculator*
  ***Note**: Only the following calculator models approved for the Fundamentals of Engineering Exam will be allowed during an exam:
  - **Casio:** All fx-115 and fx-991 models
  - **Hewlett Packard:** HP 33s and HP 35s models
  - **Texas Instruments:** All TI-30X and TI-36X models

Course Objectives and Outcomes

- **Course Objectives**:
  - Achieving the learning objectives of this course will enable the student to understand and model many important natural and engineering systems and processes involving fluid flow and turbomachinery. These objectives align with the topic coverage of the Fundamentals of Engineering Exam, the first step toward achieving licensure as a Professional Engineer.
- **Course Learning Outcomes**: Upon completion of the course the students should be able to:
  1. Articulate the properties that distinguish fluids from other forms of matter and the broad range of engineering applications that involve fluid mechanics.
  2. Apply the concepts of vector fields (velocity, force, acceleration), scalar fields (pressure, density), and vector differential and integral calculus to engineering analysis of fluids systems and the interpretation of flow physics through the conservation laws.
  3. Properly apply Newton's second law to analysis and design involving fluids at rest using integral and differential calculus, including pressure variation, forces and moments on plane surfaces, and buoyancy. Properly apply systems and control volume methods based on mass, momentum, and energy conservation, as appropriate, to the analysis and design of engineering fluids systems.
  4. Correctly interpret and apply the various differential forms of the conservation laws, particularly Newton's second law and its various approximate forms, to engineering analysis and design.
  5. Properly apply mass, momentum, and energy conservation to steady internal (pipe) flows, correctly interpret and apply laminar and turbulent flow models, and estimate head loss and power requirements in piping systems.
  6. Develop mathematical models through justifiable approximations, correctly interpret and apply the "inviscid" approximation and the "Bernoulli" relationships to the analysis of fluid systems, and estimate levels of approximation in engineering models.
  7. Apply integral methods and basic empirical and theoretical models to the analysis of boundary layer flows and to drag on bodies.

- **Alignment with Program Outcomes**:

Course Learning Outcome	Learning Level (ABET Assessment Example)	Program Learning Outcome (ABET)
1. Articulate the properties that distinguish fluids from other forms of matter, and the broad range of engineering applications that involve fluid mechanics	**Knowledge**- Ability to recall previously learned material. **ABET Assessment** – homework, Quiz	ABET 1- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. Apply the concepts of vector fields (velocity, force, acceleration), scalar fields (pressure, density), and vector differential and integral calculus to engineering analysis of fluids systems and the interpretation of flow physics through the conservation laws	**Application**- Ability to select, transfer, and use data and principles to complete a problem or a task. **ABET Assessment** – homework, Quiz, exam questions	ABET 1- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
3. Properly apply Newton's second law to analysis and design involving fluids at rest using integral and differential calculus, including pressure variation, forces and moments on plane surfaces, and buoyancy. Properly apply systems and control volume methods based on mass, momentum, and energy conservation, as appropriate, to the analysis and design of engineering fluids systems	**Application**- Ability to select, transfer, and use data and principles to complete a problem or a task. **ABET Assessment** – Quiz, exam questions	ABET 1- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
4. Correctly interpret and apply the various differential forms of the conservation laws, particularly Newton's second law and its various approximate forms, to engineering analysis and design	**Analysis**- Ability to distinguish, classify, and relate the assumptions, evidence, or structure of a question. **ABET Assessment** – homework, exam questions	ABET 1- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
5. Apply mass, momentum, and energy conservation to steady internal (pipe) flows, correctly interpret and apply laminar and turbulent flow models, and estimate head loss and power requirements in piping systems	**Application**- Ability to select, transfer, and use data and principles to complete a problem or a task. **ABET Assessment** – Quiz, exam questions	ABET 1- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
6. Develop mathematical models through justifiable approximations, correctly interpret and apply the "inviscid" approximation and the "Bernoulli" relationships to analysis of fluid systems, and estimate levels of approximation in engineering models	**Application**- Ability to select, transfer, and use data and principles to complete a problem or a task. **ABET Assessment** – homework, exam questions	ABET 1- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Attendance, Participation, Mini-Quizzes, and ICAs

- Students in **face-to-face (this includes labs and C-courses)** courses are expected "to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor" (University Policy, FPU-5.0010AP).
- Absence does not excuse a student from material covered or any activity done on that day, nor does it extend a deadline.
- Students should inform the instructor as soon as possible if an absence is expected.
- The instructor should be contacted as soon as possible if an absence is due to an unforeseen emergency. Documentation may be required in either case.
- Students are expected to participate in the classroom experience. The use of earbuds/headphones during class is specifically not allowed and students who engage in this behavior may be asked to leave the class for the day (noting exceptions for authorized accommodations). In addition, students who routinely do not bring materials to class that are required for participation, will not be given credit for class attendance, and if this becomes a pattern of behavior, may be asked to leave the class for the day. Persistent problems with participation may result in a code of conduct referral.
- There will be regular in-class participation assignments to increase engagement and understanding of the course materials. These will not take place every class and will not be announced ahead of time. Each student can drop **two** ICAs without penalty for any reason. Additional dropped ICAs will not be allowed except in exceptional extenuating circumstances.
- At various unannounced times throughout the semester, a mini-quiz containing 1 or more problems and/or multiple choice, matching, or true/false questions will be administered during class. These quizzes are meant to reinforce concepts that students have previously covered in class. During the course of the semester, each student will be allowed to drop the lowest **two** mini-quiz grades to account for any unplanned absences or university-related travel.

Late Policy

- Late submissions are not allowed for in-class assignments.
- For homework assignments, 10 points will be deducted for a late submission within 48 hours of the assignment deadline. No submissions will be accepted more than 48 hours after the deadline.
- A student missing an exam can only make up the exam in the case of an unavoidable absence due to extenuating circumstances. It is the responsibility of the student to notify the instructor before the exam or within twenty-four hours of the time of absence, at which time arrangements will be made for a make-up exam.

Assignment/Evaluation Methods

- Homework (15% of the total grade)
    - Homework must be submitted via Gradescope as a PDF file by the due date. Unless otherwise specified, solutions must be handwritten (on paper or on a tablet or other device) and submitted as a PDF. In Gradescope, it is the student's responsibility to select the appropriate pages for each question.
    - Collaboration on homework is encouraged. However, each student must submit their own work. Copying from another student or anywhere else is prohibited.

- Exams (2 @ 20% each and Final @ 22.5%)
    - The two exams during the semester will be scheduled during class hours. The dates and times of exams will be provided as soon as this information is known. The final exam will be held during the final exam period, as scheduled by the university.
    - A student missing an exam can only make up the exam in the case of an unavoidable absence due to extenuating circumstances. It is the responsibility of the student to notify the instructor before the exam or within twenty-four hours of the time of absence, at which time arrangements will be made for a make-up exam.

- Attendance (5% of the total grade)
    - It is the responsibility of the student to record attendance using the A+ Attendance app in Canvas when the professor provides the attendance code.
    - Students will earn an attendance score using the following criteria:
        - 0-3 Absences: Full Points (5/5)
        - 0.5 points will be deducted for each absence beginning with the fourth absence. For example, a student missing five classes would earn 4/5 of these attendance points.

- Mini-quizzes (15% of the total grade)
    - Mini-quizzes will occur in class and will not be announced ahead of time. A missed mini-quiz cannot be made up, but the lowest two scores will be dropped. See "Attendance, Participation, Mini-Quizzes, and ICAs" for more information.

- In-class participation assignments (2.5% of the total grade)
    - In-class participation assignments will occur either in class on paper or through Canvas. A missed in-class assignment cannot be made up, but the lowest two scores will be dropped. See "Attendance, Participation, Mini-Quizzes, and ICAs" for more information.

The assignment percentages are shown in the table below as well for reference:

Activity	**Percentage**
Homework	15
In-class Assignments	2.5
Attendance	5
Mini-quizzes	15
Exam-1	20
Exam-2	20
Final Exam	22.5

Grades will be posted to Canvas for reference only, and students should make sure they are recorded correctly. However, there is no guarantee that the percentages or projected grades provided there are correct. The instructor will calculate final percentages and will determine final grades regardless of Canvas calculations.

Grading Scale

This class will apply the following grading scale. *(See also University Grading Policy)*.

Grade	Percentage
A	93 - 100
A-	90 - 92
B+	86 - 89
B	83 - 85
B-	80 - 82
C+	76 - 79
C	70 - 75
D	60 - 69
F	0 - 59

(Grades will be rounded to the nearest whole number).

University Policies

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The Office of Disability Services (ODS), facilitates reasonable accommodations for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodations. If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal, and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in advance. Accommodations are not retroactive. If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible: DisabilityServices@floridapoly.edu; (863) 874-8770; www.floridapoly.edy/disability.

Accommodations for Religious Observances, Practices and Beliefs

The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX

Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. Any faculty or staff member you speak to is required to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discuss resources and options available.

Academic Integrity
Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in sanctions up to and including expulsion from the university.

Recording Lectures
Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action). *Recording class activities including, but not limited to, lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is* ***prohibited***.

Academic Support Resources

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Tutoring and Learning Center**: The Tutoring and Learning Center (The TLC) provides tutoring to all Florida Poly students who may need additional academic support. The TLC is staffed by students who have excelled in the courses they tutor. They offer support by reviewing concepts and materials from class, clarifying points of confusion and providing assistance with learning strategies. While the focus of TLC is to provide support to students in freshman-level courses, upper-level courses are also tutored at the Center. The TLC is located in the IST Commons (second floor).
    - **Knack Tutoring**: Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. Florida Polytechnic University has partnered with Knack to provide students with access to verified peer tutors who have previously aced this course. To view available tutors, visit floridapoly.joinknack.com and sign in with your student account.
- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit floridapoly.edu/writing center.

Course Schedule (Tentative)

- Changes in the syllabus and schedule (including assignment and exam dates) may be made as deemed appropriate. All changes will be announced in class and Canvas Announcements.
- Important Dates: https://floridapoly.edu/academics/academic-calendar/index.php

Week	Lecture	Day of Week	Date	Topic	Chapter	Due
1	1	Tuesday	1/13/2026	Introduction. Definition of Fluid, System, and Control Volume	Ch 1	
	2	Thursday	1/15/2026	Stress Field, Viscosity, Surface Tension	Ch 2	
2	3	Tuesday	1/20/2026	Fluid statics: Manometers	Ch 3	
	4	Thursday	1/22/2026	Hydrostatic Forces on a plane-submerged surface	Ch 3	HW 1
3	5	Tuesday	1/27/2026	Hydrostatic Forces on curved, submerged surfaces. Submerged bodies and buoyancy	Ch 3	
	6	Thursday	1/29/2026	Inviscid Analysis	Ch 6	HW 2
4	7	Tuesday	2/3/2026	The Bernoulli equation	Ch 6	
	8	Thursday	2/5/2026	The Bernoulli equation	Ch 6	
5	-	Tuesday	2/10/2026	Career Day, No Class		
	9	Thursday	2/12/2026	Exam Review/Buffer Day		HW 3
6	10	Tuesday	2/17/2026	Exam 1		
	11	Thursday	2/19/2026	Control Volume Analysis – The Reynolds Transport Theorem	Ch 4	
7	12	Tuesday	2/24/2026	Conservation of Mass	Ch 4	
	13	Thursday	2/26/2026	Momentum Analysis	Ch 4	
8	14	Tuesday	3/3/2026	Momentum Analysis	Ch 4	HW 3
	15	Thursday	3/5/2026	Differential Control Volume Analysis	Ch 5	
9	16	Tuesday	3/10/2026	Fluid Particle Kinematics	Ch 5	
	17	Thursday	3/12/2026	Navier-Stokes Equation	Ch 5	
10	-	Tuesday	3/17/2026	Spring Break, No Class		
	-	Thursday	3/19/2026			
11	18	Tuesday	3/24/2026	Dimensional Analysis and Similitude	Ch 7	HW 5
	19	Thursday	3/26/2026	Dimensional Analysis and Similitude	Ch 7	
12	20	Tuesday	3/31/2026	Exam Review/Buffer Day		HW 6
	21	Thursday	4/2/2026	Exam 2		
13	22	Tuesday	4/7/2026	Introduction to internal flow	Ch 8	
	23	Thursday	4/9/2026	General pipe flow analysis	Ch 8	
14	24	Tuesday	4/14/2026	General pipe flow analysis. Review	Ch 8	
	25	Thursday	4/16/2026	Introduction to Boundary Layers	Ch 9	HW 7
15	26	Tuesday	4/21/2026	Boundary Layers and Pressure Gradients	Ch 9	
	27	Thursday	4/23/2026	Drag	Ch 9	
16	28	Tuesday	4/28/2026	Final Exam Review		HW 8
TBA				Final Exam		

	Name, Title	Date
Created By		
Revised By	Younggil Park, Associate Professor	January 3, 2025
Last Modified	Caleb Traylor, Senior Instructor	January 12, 2026