Course Syllabus

(NOTE: This is a preliminary draft of the course syllabus. The final version will be provided at the end of the first week of classes)

1. Course Information

ME 3340	Fluid Mechanics (~ 3hrs/week)	**Spring Term 2026**
Mondays and Wednesdays:	To be confirmed	
Class Room Number:	To be confirmed	

2. Instructor & Grader Information

Instructor & Grader:	Prof. Dr.Louis SATYANARAYAN Ph.D.
Email :	Louis.Satyanarayan@georgiatech-metz.fr
Office Room Number:	226
Office Hours (by appointment):	Mondays: 11:00AM – 12:00 PM
	Wednesdays: 11:00 AM – 12:00 PM

I am always available for short questions or concerns just after class.

If required you may also send an email to make an appointment or come directly to my office in the slots given above.

3. General Information

- Course Outline: An introduction to fluid mechanics

Topics include fluid statics, control-volume analysis, differential analysis, laminar flows, dimensional analysis, similitude, pipe flow, and external flow.

- BRING A CALCULATOR TO THE CLASS REGULARLY

4. Textbook:

- Bruce R. Munson, Theodore H. Okiishi, Wade W. Huebsch, and Alric P. Rothmayer, Fundamentals of Fluid Mechanics, 7th Edition, John Wiley and Sons, 2013.

5. Syllabus/Topics covered

Chapter Number	Description
1.Basic Concepts	Definition and properties of Fluids, Introduction to fluid statics and kinematics, Pressure distribution in a fluid. Manometry. Force on plane and curved submerged surfaces. Buoyancy.
2.Governing Equations of Fluid Motion	Langragian and Eulerian description,
3. Fluid flow fields:	Velocity fields. Flow lines. Acceleration fields.

4.Control-volume analysis:	Reynolds transport theorem, mass, momentum and energy balance/ conservation equations,
5. Local analysis: Kinematics **Inviscid Incompressible Flows**	The stream function. Derivation of continuity and Navier-Stokes equations, Euler's equation, Bernoulli's Equation, Simple viscous-flow solutions. Stream function and Velocity potential function, Circulation, Line vortex, Basic plane potential flows: Uniform stream; Source and Sink;
6. Compressible Flows	Speed of sound and Mach number,Basic equations for one dimensional flows, Isentropic relations, Normal-shock wave
7. Dimensional Analysis	Introduction to dimensional parameters, Buckingham pi theorem. Dimensionless groups, Non-dimensional parameter in fluid mechanics, Modeling and similitude.
8. Pipe flow:	Entry region. Fully developed flow. Laminar and turbulent flow. Colebrook formula. Minor losses.
9. External flows:	Laminar and turbulent boundary layers. Flow transition. Separation. Drag
10. Flow Measurement Techniques	Measurements Temperature, Pressure Measurements: Pressure transducers, pitot tube, Velocity/Discharge measurements: Orifice meter, Venturiemeter,Anemometer, Force Measurements: Strain gauges force balances, Flow Visualization:

6. Pre &/or CoRequisites

Contact Academics Office (GTA)

(highly desirable to have):

- ME 2202 Dynamics of Rigid Bodies,
- MATH 2401 Calculus III (C or better), and
- MATH 2403 Differential Equations (C or better)

Co-requisites: ME 3322 Thermodynamics

7. Course Outcomes:

Outcome 1: To develop a student's understanding of the basic principles of fluid mechanics.

1.1 The student will demonstrate an ability to recognize the type of fluid flow that is occurring in a particular physical system.

1.2 The student will demonstrate an ability to choose the appropriate fluid mechanical principles needed to analyze fluid-flow situations.

Outcome 2: To develop a student's skills in analyzing fluid flows through the proper use of modeling and the application of basic fluid-flow principles.

2.1 The student will demonstrate an ability to apply appropriate simplifying assumptions and basic fluid-flow principles to formulate a mathematical description of a simple fluid-flow system.

2.2 The student will demonstrate an ability to solve and analyze the mathematical equations for a simple fluidflow system.

Outcome 3: To provide the student with some specific knowledge regarding fluid-flow phenomena observed in mechanical engineering systems, such as flow in a pipe, boundary-layer flows, drag, etc.

3.1 The student will be able to recognize basic flow phenomena that are present in a typical engineering system.

3.2 The student will demonstrate knowledge of important practical results in common fluid flows and their physical implications.

8. Correlation between Course Outcomes and Student Outcomes:

ME3340 FLUID MECHANICS											
	Mechanical Engineering Student Outcomes										
Course Outcomes	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Outcome 1.1	**x**				**x**						**x**
Outcome 1.2	**x**				**x**						**x**
Outcome 2.1	**x**				**x**						**x**
Outcome 2.2	**x**				**x**						**x**
Outcome 3.1	**x**				**x**						**x**
Outcome 3.2	**x**				**x**						**x**

9. GWW School of Mechanical Engineering Student Outcomes:

a. an ability to apply knowledge of mathematics, science and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multidisciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively

h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. a recognition of the need for, and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

10. GT Academic Honor Code

As usual the GT Academic Honor Code is followed for this class. Please check this link for clear information : http://www.honor.gatech.edu/plugins/content/index.php?id=9