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 2027**
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

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. Pre &/or CoRequisites

Contact Academics Office (GTA) for accurate information

(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

5. 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.

6. 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: