

## 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)	<b>Fall Term 2026</b>
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 :	<a href="mailto:Louis.Satyanarayan@georgiatech-metz.fr">Louis.Satyanarayan@georgiatech-metz.fr</a>
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
<b>1. Basic Concepts</b>	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.
<b>2. Governing Equations of Fluid Motion</b>	Lagrangian and Eulerian description,
<b>3. Fluid flow fields:</b>	Velocity fields. Flow lines. Acceleration fields.
<b>4. Control-volume analysis:</b>	Reynolds transport theorem, mass, momentum and energy balance/ conservation equations,
<b>5. Local analysis: Kinematics</b>  <b>Inviscid Incompressible Flows</b>	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;
<b>6. Compressible Flows</b>	Speed of sound and Mach number, Basic equations for one dimensional flows, Isentropic relations, Normal-shock wave
<b>7. Dimensional Analysis</b>	Introduction to dimensional parameters, Buckingham pi theorem. Dimensionless groups, Non-dimensional parameter in fluid mechanics, Modeling and similitude.
<b>8. Pipe flow:</b>	Entry region. Fully developed flow. Laminar and turbulent flow. Colebrook formula. Minor losses.
<b>9. External flows:</b>	Laminar and turbulent boundary layers. Flow transition. Separation. Drag
<b>10. Flow Measurement Techniques</b>	Measurements Temperature, Pressure Measurements: Pressure transducers, pitot tube, Velocity/Discharge measurements: Orifice meter, Venturiemeter, Anemometer, Force Measurements: Strain gauges force balances, Flow Visualization: