

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)	Fall Term 2025
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. Pre &/or CoRequisites

Contact Academics Office (GTA) for accurate information

(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

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	Lagrangian 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	The stream function. Derivation of continuity and Navier-Stokes equations, Euler's equation, Bernoulli's Equation, Simple viscous-flow solutions.
Inviscid Incompressible Flows	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:

7. 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>

8. Canvas

Your instructor uses CANVAS to send you messages and your results of homeworks and quizzes. You are supposed to check your ME3340 messages and announcements every day to make sure you don't miss anything. It is not guaranteed that the system will email you messages after being posted.

9. GRADING**a. WEIGHT:**

- Quiz 1 : 20% (closed book, closed notes, will include Chapters 1-2, more info below)
- Quiz 2 : 20% (closed book, closed notes, will include Chapters 3-4, more info below)
- Quiz 3 : 20% (closed book, closed notes, will include Chapters 5-6, more info below)
- Homework: 10% (10 small HW, 1 mark each)
- Final Exam: 30% (closed book, closed notes, All chapters from 1-10, more info below)

You are however allowed to bring a calculator, a unit conversion sheet

For each item or assignment, you will receive a numerical grade on canvas. These numbers must be interpreted as :

90%-100%	:	A
80%-89.99%	:	B
70%-79.99%	:	C
60%-69.99%	:	D
below 60%	:	F

Should canvas make any calculation for you, ignore it, because it does not count the above-mentioned weights for each task.

10. Course Expectations & Guidelines**a. BEHAVIOR IN CLASS :**

Class participation (being present, paying attention, asking questions if needed, ...) is perfect. What is not OK is "noise". Noise means that you disturb your teacher and also your colleague students who equally paid their tuition fees and have the right to follow my class. For urgent matters, you are excused to leave class briefly and then to return (bathroom, water fountain, something urgent, ...) – do it quietly please.

b. Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit

<http://www.catalog.gatech.edu/policies/honor-code/> or

<http://www.catalog.gatech.edu/rules/18/>.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

c. Attendance and/or Participation

Attendance and participation in class is required. If you miss class for any reason, it is your responsibility to obtain the notes for that day from a fellow student. This includes any announcements, concerns, helpful hints, etc. given by the instructor to the class.

d. Collaboration & Group Work

- Discussions between students on homework problems outside of class and during in-class problem solving sessions is encouraged.
- However, quizzes and exams must be written and submitted by each student independently.
- Copying and/or cutting and pasting someone else's work and submitting it as your own is not permitted.

e. Extensions, Late Assignments, & Re-Scheduled/Missed Exams

- No credit will be given for the late submission of any course work.
- It is your responsibility to ensure that your work is submitted to Canvas by the appropriate time.
- Any work missed because of Institute-approved activities (e.g., field trips and athletic events) can be made up.

11. Acknowledgements (for making the core of this syllabus):

Sections 2-8 and 13 prepared by: Marc K. Smith with changes incorporated by Louis Satyanarayan

Sections 9-13 prepared by: N. Declercq with changes incorporated by Louis Satyanarayan