Indian Institute of Technology Kanpur
Department of Mechanical Engineering

ME 231A: FLUID MECHANICS
Semester: 2016-17-II

Instructor: Arun K Saha, Mechanical Engg. Dept., Office: SL210, Ph: 7869, Email: *aksaha@iitk.ac.in*
Office Hours: Appointment via email.
Lectures: Monday, Wednesday and Friday: **10:00 – 11:00 hrs** in **L4.**
Laboratories: Monday and Friday: **15:00 - 17:00 hrs in FM Laboratory, NL-I (3rd Floor).**

Course Outline:

1. Fluid Statics and Kinematics.
2. Control Volume Approach.
3. Dimensional Analysis.
4. Governing Equations-Mass and Momentum.
5. Exact Solutions.
6. Potential Theory.
7. Boundary layers.
8. Turbulent Flow.
9. Compressible Flow.

Text Book:

Fluid Mechanics by *F. M. White* (*7th Edition. Tata McGraw-Hill, 2011*)

Suggested Reference Books:

Advanced Engineering Fluid Mechanics by *K. Muralidhar and G. Biswas* (*Narosa, 3rd Edition, 2015*)

Introduction to Fluid Mechanics by *R. W. Fox, Philip J. Pritchard and A. T. McDonald (7th Edition, Wiley India, 2009)*

Introduction to Fluid Mechanics and Fluid Machines by *S. K. Som and G. Biswas (2nd Edition, Tata McGraw-Hill, 2006)*

Fluid Mechanics-Fundamentals and Applications by *Y. A. Cengel and John M. Cimbala (3rd Edition, Tata McGraw-Hill, 2014)*

Introduction to Fluid Mechanics by *James A Fay (Prentice Hall India Learning Pvt Ltd, 1996)*

Grading:

Mid Semester Examination:	25%
End Semester Examination:	35%
Quiz (Announced) (Four nos):	15%
Laboratory:	20%
Attendance:	5%

Grading will be relative. However for a passing grade, a minimum of absolute performance is necessary.

Students failing to have 80% attendance may be recommended for de-registration. In addition to the announced quizzes, there may be surprise quizzes during the lecture hour.

Make-up Examinations:

The level of the make-up examinations will be tougher than the regular ones.

Missing mid-semester examination/quiz: Make-up examination will be offered *only for students who have a valid medical certificate from the institute's health center or leave certificate*. The date will be announced in due

course. If a student misses a mid-semester examination, he/she must immediately contact the Instructor and submit the valid medical or leave certificate. ***There will be no make-up for quizzes***.

Missing the end-semester examination: Students missing end semester examination will need to apply to DOAA office/instructor with required documents, and the approval for make-up will be decided by DOAA office/instructor. The make-up examination will be conducted as per the timetable announced by DOAA/instructor.

Note:
• Misconduct of any kind (such as proxy in attendance or adopting unfair means during examinations, copying assignments) will be duly reported to institute authorities.
• Mobile phones must be *switched off* during lectures.
• You must arrive at the right time for the lectures.

TAs:

1. Ms Swati Singh, Office: Room # SL210, Phone: 7987, email: swatisi@iitk.ac.in
2. Mr. Vyas S, Office: Room # SL109, Phone: 6140, email: vyassr@iitk.ac.in
3. Mr. Shadab Alam, Office: Room # SL210, Phone: 7987, email: shadab@iitk.ac.in

Office Hours: Appointment via email.

Lectures may be supplemented by several videos and practice hours.
Assignments/Practice problems were selected from the text/reference books but do not carry a grade.

The course is accompanied by the six laboratory experiments that closely relate to the theory. These are selected from the following list:

- **Impact of a liquid jet on flat and curved surfaces.**
- **Measurement of drag on a circular cylinder in high Reynolds number flow.**
- **Energy loss measurements in subcritical and supercritical open channel flow.**
- **Measurement of fluid – gas and liquid, viscosity.**
- **Determination of friction factor as a function of Reynolds number in pipe flow.**
- **Study of laminar-turbulent transition during flow in a tube.**
- **Boundary layer flow over a flat plate.**
- **Pressure distribution around a circular cylinder in high Reynolds number flow.**