

**NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**  
**Department of Mechanical Engineering**

**MEPC18: FLUID MECHANICS**

Course Title	: Fluid Mechanics	Course Code	: MEIR18
No. of Credits	: 03	Pre-requisites Course Code	: Nil
Contact Class Timings	: Monday (9.20 to 10.10 a.m.), Tuesday (10.30 to 11.20 a.m.), Wednesday (11.20 a.m. to 12.10 p.m.)		
Department	: Mechanical Engineering	Course Type	: Core
Course Coordinator	: Dr. R. B. Anand	Coordinator Office	: Mechanical Engineering Department Faculty Block
E-mail	: rbanand@nitt.edu	Phone No.	: 0431-2503409

**COURSE OVERVIEW**

The course has been devised to impart the fundamental of mechanics of fluids in-line with analysis of fluid in rest and in motion and the effects physical properties of fluids on buoyancy, boundary layer, flow measurements and internal & external fluid flow. The course familiarises the students with the types and properties of fluids, applied fluid mechanics and design of any physical system related with fluid in a very precise and interesting manner and thereby opens an a platform to their core field with their area respective branch of study.

**COURSE OBJECTIVES AND EXPECTED OUTCOME**

Objectives:

- To explain the importance of analysis of fluids in rest and in motion. conservation equations.
- To introduce the techniques for analyzing the fluid related forces, momentum, power and conservation equations.
- To introduce the various properties of fluids, and the techniques of selection of flow measuring instruments.
- To introduce the concept, applications and limitations of dimensional analysis.

Outcome:

The terminal objectives of the course is that, on successful completion of teaching-learning and evaluation activities, a student would be able to identify, appreciate and analyze the problems by applying the fundamentals of fluid mechanics and to proceed for the development of the fluid mechanical systems.

**COURSE SYLLABUS**

Basic concepts, fluid properties, basic hydrostatic equation, manometry, submerged and floating bodies, pressure at a point, hydrostatic equations for incompressible and compressible fluids, manometers, hydrostatic force on a submerged plane and curved surfaces, buoyancy and equilibrium of floating bodies, metacentre, fluid in rigid motion bodies, fluid dynamics, integral and differential formulations, continuity equation, Navier-Stokes equations, laminar and turbulent flows, some exact solutions of Navier-Stokes equations, flow through pipes, fluid rotation and deformation, stream function, condition of irrotationality, governing equations of potential flow, Laplace equation, boundary layer concept, Prandtl's equation, drag on flat plates, Buckingham PI theorem, dimensionless numbers.

**COURSE ASSESSMENT METHODS**

Sl. No.	Mode of Assessment	Week / Date	Duration	% Weightage
1.	Cycle Test - 1	After 6 <sup>th</sup> week	75 Minutes	25
2.	Cycle Test – 2	After 11 <sup>th</sup> week	75 Minutes	25
3.	Surprise Test – 1	After 3 <sup>rd</sup> week	45 Minutes	05
4.	Surprise Test - 2	After 9 <sup>th</sup> week	45 Minutes	05
5.	End Examination	----	150 Minutes	40

## REFERENCES


As the course syllabus comprises all major topics of fluid mechanics, the students are expected to refer standard textbooks of all individual topics and are advised not to miss any contact classes. Some of the popular books in the area of Fluid Mechanics are

1. Yuan Shao-Wen, Foundations of Fluid Mechanics
2. Frank M. White, Fundamentals of Fluid Mechanics
3. Fox, R. W. and Mc Donald, A.T., Introduction to Fluid Mechanics
4. Yunus A. Cengel, and John M. Cimbala, Fluid Mechanics: Fundamentals and Applications
5. Bruce R. Munson, Alric P. Rothmayer, Theodore H. Okiishi, Wade W. Huebsch, Fundamentals of Fluid Mechanics
6. K. L. Kumar, Engineering Fluid Mechanics
7. D. S. Kumar, Fluid Mechanics and Fluid Power Engineering

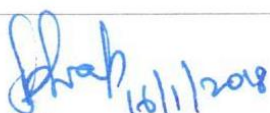
## ATTENDANCE AND ASSESMENT POLICY

1. Attendance will be taken by the faculty in all contact hours. The students, who have more than 75 % attendance and scored (combined) 50 % marks in CT-1 and CT-2 will be permitted to appear end examination.
2. The students, who have more than 75 % attendance and scored less than (combined) 50 % marks in CT-1 and CT-2 will be permitted to appear end examination only after the submission of ASSIGNMENT(S). The assignment (tutorial) sheet will be circulated to those students through the Class Representative.
3. The students, who have attendance of 60 to 75 % and scored more than (combined) 50 % marks in CT-1 and CT-2 will be permitted to appear end examination only after the submission of ASSIGNMENT(S). The assignment (tutorial) sheet will be circulated to those students through the Class Representative.
4. The students, who have attendance of less than 50 % will not be permitted to appear end examination and they have to redo the course.
5. If any student is not able to attend any of the Continuous Assessments (CAs: 1 - 4) due to genuine reason, student is permitted to attend the Compensation Assessment (CPA) with % weightage equal to maximum of the CAs. However, the maximum of % weightage among the assessments for which the student was absent will be considered for computing marks for CA. (This is not valid for students who have attendance lag). At any case, CPA will not be considered as an improvement test.
6. Students are expected to score minimum 30 % of the maximum mark of the class in the CAs to attend the end semester examination in addition to the attendance requirement. Otherwise the student is permitted to attend CPA and is expected to score more than 60 % marks to get eligibility to appear for end semester examination. However, the score in CPA WILL NOT be considered for computing marks for CA. student who fails to score 60 % in CPA will take up additional assignments to get eligibility for writing end semester examination.
7. Finally, every student is expected to score minimum 35 % of the maximum mark of the class in the total assessment (1, 2, 3, 4, and 5) to pass the course. Otherwise the student would be declared fail and F grade will be awarded.
8. The portions for any assessment will be the topics covered one day before the date of assessment and the schedule of the assessments (1, 2 and 5) will be informed well in advance. However, the surprise tests are mainly with numerical, hence all students are expected to bring their calculator for all contact hours.
9. All the students are expected to be genuine during the course work. Taking of information by means of copying simulations, assignments, looking or attempting to look at another students paper or bringing and using study material in any form for copying during any assessments is considered dishonest.
10. Tendering of information such as giving one's program, simulation work, assignments to another student to use or copy is also considered dishonest.
11. Preventing or hampering other students from pursuing their academic activities is also considered as academic dishonesty.

The Course Coordinator is available for consultation at his department office. Queries may also be emailed to the Course Coordinator directly at [rbanand@nitt.edu](mailto:rbanand@nitt.edu)

Course Faculty:   
January 12, 2018  
Dr. K. B. Anand

CC-Chairperson:   
16/1/18

HOD:   
16/1/2018