



**NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI
DEPARTMENT OF MECHANICAL ENGINEERING**

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COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech Thermal Power Engineering		
Course Title	Advanced Fluid Mechanics		
Course Code	ME603	No. of Credits	03
Course Code of Prerequisite subject(s)	-	-	-
Session	JULY 2021	Section (if, applicable)	-
Name of Faculty	P Kaushik	Department	Mechanical Engineering
Official Email	pkaushik@nitt.edu	Telephone No.	+91 9632253573
Name of Course Coordinator(s) (if, applicable)	-		
Official E-mail	-	Telephone No.	-
Course Type (please tick appropriately)	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
<p>Review of Basic concepts-Reynold’s transport theorem, Fluid kinematics –</p> <p>Physical conservation laws -Integral and differential formulations. Navier-Stokes and energy equations -Dimensionless forms and dimensionless numbers -Solution of Navier-Stokes equations.</p> <p>Two-dimensional Potential flows -Different types of flow patterns, complex potential conformal mapping.</p> <p>Momentum integral approach. Turbulent flows -Reynolds equation and closure problems, free and wall bounded shear flows-Prandtl and von Karman hypothesis-Universal velocity profile near a wall-flow through pipes. Boundary layer concept.</p> <p>Boundary layer thickness-Prandtl’s equations-Blasius solution-skin friction coefficient</p> <p>Reference Books:</p> <ol style="list-style-type: none"> 1. L. G. Currie, Fundamental Mechanics of Fluids, 3rd ed., CRC Press, 2002. 2. F. M. White, Viscous Fluid Flow, 2nd ed., McGraw-Hill, 1991. 3. H. Ockendon. and J. R. Ockendon, Viscous Flow, Cambridge Uni. Press, 1995. 4. H. Tennekes and J . L. Lumley, A first course in turbulence, MIT Press, 1972 5. P. J. Kundu and I. M. Cohen, Fluid mechanics, 4th Ed, Academic Press, 2008 			



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COURSE OBJECTIVES

1. To familiarize with the properties of fluids and the applications of fluid mechanics.
2. To formulate and analyze problems related to calculation of forces in fluid structure interaction.
3. To classify flows and to understand and apply the conservation principles for fluid flows.
4. To understand the principles of dimensional analysis.

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
Identify and obtain the values of fluid properties and relationship between them and understand the principles of continuity, momentum, and energy as applied to fluid motions.	PO1, PO2
Recognize these principles written in form of mathematical equations	PO2, PO3
Apply dimensional analysis to predict physical parameters that influence the flow in fluid mechanics	PO3, PO5

COURSE PLAN – PART II

COURSE OVERVIEW

The basic course provides a structured approach on solving problems related to fluid mechanics and machines.

COURSE TEACHING AND LEARNING ACTIVITIES

(Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	1st Week	Review of Basic concepts	Online board
2	2nd Week	Reynold's transport theorem	Online board
3	3rd Week	Fluid kinematics	Online board
4	4th Week	Physical conservation laws - Integral and differential formulations	Online board
5	5th Week	Navier-Stokes and energy equations -Dimensionless forms and dimensionless numbers	Online board
6	6th Week	-Solution of Navier-Stokes equations	Online board
7	7th Week	-Solution of Navier-Stokes equations continued	Online board



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8	8th Week	Two-dimensional Potential flows -Different types of flow patterns, complex potential conformal mapping.	Online board
9	9th Week	Momentum integral approach	Online board
10	10th Week	Prandtl and von Karman hypothesis-Universal velocity profile near a wall-flow through pipes. Boundary layer concept.	Online board
11	11th Week	Boundary layer concept.	Online board
12	12th Week	Boundary layer thickness- Prandtl's equations- Blasius solution-skin friction coefficient	Online board
13	13th Week	Turbulent flows	Online board
14	14th Week	Reynolds equation and closure problems, free and wall bounded shear flows	Online board

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Quizzes/Class Test/Assignments	Through Semester	Varying	20%
2	CT1	As decided by CC	1.5 hours	25%
3	CT2	As decided by CC	1.5 hours	25%
CPA	Compensation Assessment*	As decided by CC	1.5 hours	25%
4	Final Assessment *	As per institute norms	2 hours	30%

***Only for mid semester exam; refer to guidelines on page 5**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)



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1. Students feedback through class committee meetings
2. Feedback questionnaire from students – at the end of the semester
3. Feedback from students on the course outcomes shall be obtained at the end of the course

COURSE POLICY (including compensation assessment to be specified)

Mode of Correspondence

1. The students can communicate using the email id: pkaushik@nitt.edu and through Microsoft Teams for any academic related issues (including sharing of study materials) with respect to this course.

Compensation Assessment

1. Attending all the assessments (1,2, 4) are mandatory for every student. Flexibility is given to the students to fix the date for each mode of evaluation convenient to majority of the students.
2. If any student fails to attend the mid sem exam due to genuine reason like medical emergency, the student may be permitted to appear the compensation assessment (CPA) on submission of appropriate documents as proof and permission of the head of the department. (Not valid for students having attendance lag).
3. Under no circumstance, the compensation assessment (CPA) will be considered as an improvement test.
4. The minimum marks for passing this course and grading pattern will adhere to the regulations of the institute.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.



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ADDITIONAL INFORMATION, IF ANY

FOR APPROVAL

Course Faculty

CC- Chairperson

HOD

Guidelines

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- e) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- f) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.