

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN.			
Course Title	ADVANCED FLUID MECHANICS		
Course Code	ME603	No. of Credits	3
Department	ME	Faculty	HARSHIN KAMAL A
Pre-requisites Course Code	MEPC18		
Course Coordinator(s) (if, applicable)			
Other Course Teacher(s)/Tutor(s) E-mail	harshinkamal@gmail.com	Mobile Number	08547360668
Course Type	Core course		
COURSE OVERVIEW			
<p>This course is a survey of principal concepts and methods in fluid dynamics. After the course students will get familiar with fundamental aspects, governing equations of fluid flow and their application to simple flow problems. The topics have been chosen from the broad areas of Fluid Mechanics emphasizing mathematical formulation of various flow problems. Attempt has been made to introduce advanced theories so that students can expertise and pursue research in the relevant areas.</p>			
COURSE OBJECTIVES			
<ol style="list-style-type: none"> 1. To review the basic concepts in fluid mechanics. 2. To introduce governing equations of fluid flow and their numerical solution 3. To enable students to model a vast range of physical phenomena which plays a vital role in science and engineering. 4. To introduce students to theory and modelling of turbulent flows. Understanding chaotic nature of turbulence and its implications are emphasized. 5. To familiarise students with potential flow theory and boundary layer 			

COURSE OUTCOMES

1. Understanding the basic concepts of fluid dynamics and the modelling of fluids
2. Understanding the basic physical meaning of general equations and terms in it.
3. Ability to derive the equation for viscous flow, including laminar flow and turbulent flow.
4. Ability to address engineering problems in fluid mechanics, and to solve such problems

COURSE TEACHING AND LEARNING ACTIVITIES

S.no	Week	Topic	Mode of delivery
1.	1-3	Review of Basic concepts- Reynold's transport theorem, Fluid kinematics - Physical conservation laws - Integral and differential formulations	Class room lecture, Assignments, Presentation of multimedia like videos, pictures, slides if required
2.	4-6	Navier-Stokes and energy equations - Dimensionless forms and dimensionless numbers - Solution of Navier-Stokes equations.	
3.	7-10	Two-dimensional Potential flows - Different types of flow patterns. Boundary layer theory - Blasius solution - Momentum integral approach	
4.	11-14	Turbulent flows - Reynolds equation - Prandtl and von Karman hypothesis- Universal velocity profile near a wall-flow through pipes	
5.	15-16	Boundary layer concept- Boundary layer thickness- prandtl's equations-blassius solution-skin friction coefficient.	

COURSE ASSESSMENT METHODS

S.no	Mode of Assessment	Week/ Date	Duration	% Weightage
1.	Assessment – 1 (Written Exam)	6 th Week	90 Minutes	20%
2.	Assessment – 2 (Written exam)	11 th Week	90 Minutes	20%
3.	Assessment – 3 (Mini project/ Quizzes/Assignments)	-----	-----	10%
4.	Compensation Assessment (CPA)	Before End Semester	90 Minutes	Corresponding Weightage
5.	Assessment – 4 (Written Exam)	End Semester	120 Minutes	50%

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

Text Books:

1. Currie, LG., *Fundamental Mechanics of Fluids*, 3rd ed., CRC Press, 2002.
2. White, P.M., *Viscous Fluid Flow*, 2nd ed., McGraw-Hill, 1991.
3. Ockendon, H. and Ockendon, J., *Viscous Flow*, Cambridge Uni. Press, 1995.

Reference Books:

1. Frank M. White, *Fluid Mechanics*, Tata McGraw-Hill, Singapore, Seventh Edition, 2015.
2. Batchelor G.K, *An Introduction to Fluid Dynamics*, Cambridge University Press, 1983.
3. Fox W. Robert, McDonald T. Alan, *Introduction to Fluid Mechanics*, Fourth Edition, John Wiley & Sons, 1995.

COURSE FEED BACK

Students will be encouraged to submit feedbacks on the course throughout the course periodically using an anonymous online feedback webpage. It will be mandatory for students give feedback three times during the course on stipulated dates.

CORRESPONDENCE

All the students are advised to come to the class regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/any other information regarding this course) will be distributed in the class or a webpage created specifically for the course.

ATTENDANCE

1. Attendance will be taken by the faculty in all the contact hours. Every student should maintain minimum of 80 % physical attendance in these contact hours, along with assessment criteria to attend the end semester examination.
2. Any student, who fails to maintain 75% attendance need to appear for the compensation assessment (CPA). Student who scores more than 50 % marks in the CPA along with assessment criteria will be eligible for attending the end semester examination.
3. Those students who have attendance shortage and also missed any of the continuous assessments (CAs) can appear for CPA to get eligibility for writing the end semester examination as quoted. Their scores in the CPA WILL NOT be taken into account for computing marks for CA.
4. Students not having 75% minimum attendance at the end of the semester and also failing in CPA (scoring less than 50%) will have to RE DO the course.

ASSESSMENT

5. Attending all the assessments are MANDATORY for every student.
6. If any student is not able to attend any of the Assessments due to unavoidable circumstances, student is permitted to attend the Repeat assessment (RA) with Corresponding weightage.
7. Student who fails to score 50% in RA will take up additional assignments to get eligibility for writing End Semester examination.

Finally, every student is expected to score minimum half the marks of the mean of the class (Including all the assessments) to pass the course. Otherwise the student would be declared fail and 'F' grade will be awarded. Further he can take up only FORMATIVE ASSESSMENT.

8. Please refer M.Tech Regulations for the letter grades and the corresponding grades

ACADEMIC HONESTY & PLAGIARISM

1. All the students are expected to do original work during the course work. Collecting information by means of copying simulations or assignments, attempting to copy from another student's assessment paper or bringing and using unauthorized study material in any form during any assessments is considered as dishonest.
2. Tendering of information such as giving one's program, assignments to another student to use or copy is also considered as dishonest.
3. Preventing or dissuading other students from pursuing their academic activities is also considered as academic dishonesty.
4. Any evidence of such academic dishonesty will result in the loss of marks on that assessment. Additionally, the names of those students so penalized will be reported to the class committee chairperson and HoD of the concerned department.
5. Students who honestly producing original and outstanding will be rewarded with bonus marks in the assessment.

ADDITIONAL COURSE INFORMATION

1. The faculty is available for consultation at times as per the intimation given by the faculty.
2. Queries (if required) to the course teacher may only be emailed to the email id specified by the faculty (harshin@nitt.edu)

FOR SENATE'S CONSIDERATION

Course Faculty  CC-Chairperson  HOD 

Course Co-ordinator N.A.