NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF ENERGY AND ENVIRONMENT

COURSE PLAN – PART I			
Name of the programme and specialization	**M.Tech. (Energy Engineering)**		
Course Title	**Computational Fluid Dynamics Laboratory**		
Course Code	**EN608**	**No. of Credits**	**01**
Course Code of Pre-requisite subject(s)	**Nil**		
Session	**January 2021**	**Section (if, applicable)**	~~**A / B**~~
Name of Faculty	**Dr. Ruben Sudhakar D**	**Department**	**Energy and Environment**
Official Email	**rubensudhakar@nitt.edu**	**Telephone No.**	**0431-2503135**
Name of Course Coordinator(s) (if, applicable)	**Dr.M.Premalatha, HoD, DEE**		
Official E-mail	**-**	**Telephone No.**	
Course Type (please tick appropriately)	☑ **Core course**	☐ **Elective course**	

Syllabus (approved in BoS)

Flow in static mixer, Flow in a process injection-mixing pipe, Flow from a circular vent, Flow in an Axial rotor /stator arrangement, Multiphase flow in mixing vessel, External flow over Ahmed body, Supersonic flow in a Laval nozzle, Flow through a butterfly valve, Flow through an automatic catalytic converter, Flow through an engine inlet valve, Conjugate heat transfer in a process-heating coil, Combustion and radiation in a Can Combustor

COURSE OBJECTIVES

To impart knowledge of the basic CFD software tools and analyze different fluid flow and heat transfer

MAPPING OF COs with POs

Course Outcomes	**Programme Outcomes (PO)** (Enter Numbers only)
1. Use modern CFD software tools to design flow geometries, generate an adequate mesh for an accurate solution.	**POs 1,4,5,12**
2. Setup appropriate solvers to obtain a flow solution, and visualize the resulting flow field. Analyze a flow field to determine various quantities of interest, such as flow rates, heat fluxes, pressure drops, losses using flow visualization and analysis tools.	
3. Execute the appropriate model to a specific problem, to investigate the fluid-flow behavior and to understand the	

results.	
4. Communicate the results of the detailed fluid-flow study in a written format as per the industry standards.	

COURSE PLAN – PART II			
COURSE OVERVIEW			
This course will provide the fundamentals of CFD for engineers, and an introduction to the methods and analysis techniques used in CFD. It also provides an introduction to the use of commercial CFD codes to analyse flow and heat transfer analysis in problems of practical engineering interest			
COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	**Week/Contact Hours**	**Topic**	**Mode of Delivery**
1	1	Geometry creation – Session01	On-line demonstration
2	2	Geometry creation – Session02	On-line demonstration
3	3	Flow in static mixer	On-line demonstration
4	4	Flow in a process injection-mixing pipe	On-line demonstration
5	5	Flow from a circular vent	On-line demonstration
6	6	Flow in an Axial rotor /stator arrangement	On-line demonstration
7	7	Multiphase flow in mixing vessel	On-line demonstration
8	8	External flow over Ahmed body	On-line demonstration
9	9	Supersonic flow in a Laval nozzle	On-line demonstration

10	10	Flow through a butterfly valve	On-line demonstration
11	11	Flow through an automatic catalytic converter	On-line demonstration
12	12	Flow through an engine inlet valve	On-line demonstration
13	13	Conjugate heat transfer in a process-heating coil	On-line demonstration
14	14	Combustion and radiation in a Can Combustor	On-line demonstration

COURSE ASSESSMENT METHODS (shall range from 1 to 6**)**

S.No.	Mode of Assessment	Week/Date (tentative)	Duration (tentative)	% Weightage
1	On-time submission of laboratory excercises	1-14 weeks	1 week for each excercise	70
2	Final Assessment * (End-semester exam)	Week 15	2-3 hours	30
CPA	Compensation Assessment*	Week 15	60 minutes	30

***mandatory; refer to guidelines on page 4**

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

Feedback must be given through MIS portal, at the end of the semester. Feedback to the instructor can also be given anytime during the semester through email (rubensudhakar@nitt.edu).

COURSE POLICY (including compensation assessment to be specified**)**

MODE OF CORRESPONDENCE (email/ phone etc)

Students can email me at rubensudhakar@nitt.edu. From the time students are allowed to physically attend classes, they can meet me in my office (MN 103, DEE building)

Compensation Assessment will be conducted only for students who miss quiz-I or Quiz-II on valid/genuine grounds of medical or other emergencies.

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.

ADDITIONAL INFORMATION, IF ANY

Suggested Readings/References

1) Jiyuan Tu, Guan Heng Yeoh, Chaoqun Liu, *"**Computational Fluid Dynamics: A practical Approach**, 2nd Edition, Butterworth-Heinemann, 2012*

2) Anderson, "***Computational Fluid Dynamics: The Basics with Applications***" McGrawhiil Company, 1995

3) *https://www.ansys.com/en-in/*

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) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.

f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.

g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.