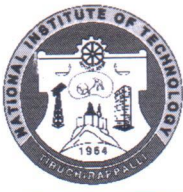


NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF ENERGY AND ENVIRONMENT

COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech. Energy Engineering		
Course Title	Design of Heat Transfer Equipment		
Course Code	EN 616	No. of Credits	03 (3-0-0)
Course Code of Pre-requisite subject(s)			
Session	July / January 2020	Section (if, applicable)	A / B
Name of Faculty	Ruben Sudhakar D	Department	Energy and Environment
Official Email	rubensudhakar@nitt.edu	Telephone No.	9481208902
Name of Course Coordinator(s) (if, applicable)	Dr.N.Anantharaman, Head, DEE		
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	<input type="checkbox"/> Core course	<input checked="" type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
<p>Types – Details – Specifications for heat exchangers – Standards of heat exchangers Study of different methods used for design of heat exchangers, classification, design methodology, LMTD and NTU methods. Design of double pipe heat exchanger-study and performance - Design of shell and tube heat exchanger. Extended surfaces, fin design, longitudinal and transverse fins. Regenerators - Plate type heat exchangers - Compact heat exchangers- Cross flow heat exchangers</p>			
COURSE OBJECTIVES			
<p>(1) Provide a broad exposure to heat transfer equipment (2) Train students to connect with the fundamental concepts of heat transfer and put them to practice in real-life situations (3) Train students to design different types of heat exchangers, involving layout, thermal, hydraulic and mechanical design, with real examples from industry</p>			



MAPPING OF COs with POs	
Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. Describe and compare the different types of Heat Exchange Equipment (HTE)	POs 1,2,3,7, and 12
2. Conceive HTE design based on the information provided for a particular application	
3. Predict the thermal behaviour	
4. Perform (a) mechanical design of HTE as per the relevant standards/codes, following necessary safety measures and (b) cost and economic analysis	

COURSE PLAN – PART II			
COURSE OVERVIEW			
EN 616 deals with thermal, hydraulic and mechanical design of THE, used in various applications and their specialities.			
COURSE TEACHING AND LEARNING ACTIVITIES			(Add more rows)
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	1 to 5 weeks	<ul style="list-style-type: none"> • Introduction • Revisit to basics of heat transfer • Classification of heat exchangers(HXs), specifications of HXs • LMTD method of thermal design of HXs and numerical problems • NTU method of thermal design of HXs and numerical problems HXs in the context of course include double-pipe, shell and tube, plate type, and regenerators	Lecture/board
2	6-10 weeks	<ul style="list-style-type: none"> • Non-dimensional numbers • Kern's Method and numerical problems • Bell's and other Methods and numerical problems • Hydraulic design of HXs 	Lecture/board/power point presentations
3	11-15 weeks	<ul style="list-style-type: none"> • Mechanical design and TEMA standards • Flow induced vibrations and prevention • Cost and economic analysis 	Lecture/board/power point presentations



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Quiz-1	End of 4 th week	50 minutes	20%
2	Quiz-2	End of 11 th week	50 minutes	20%
3	Assignments/Seminars/ software exercises	2 nd -14 week	Cummulative weightage of assignments	10%
CPA	Compensation Assessment*	14 th week	50 minutes	20%*
4	Final Assessment *	End of semester	180 minutes	50%

*mandatory; refer to guidelines on page 4

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

Feedback is obtained by the institute through MIS

COURSE POLICY (including compensation assessment to be specified)

MODE OF CORRESPONDENCE (email/ phone etc)

Students can meet me in my office (MN 103, DEE building) or email me at rubensudhakar@nitt.edu

COMPENSATION ASSESSMENT POLICY

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.


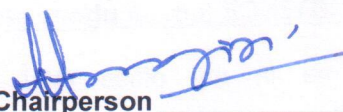
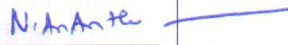
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

Text Books and Reference

1. R.K. Shah, E.C.Subbarao, R.A.Mashelkar (Eds.), "Heat Transfer Equipment Design", Hemisphere Pub. Corp., Washington
2. D.Q. Kern, "Process Heat Transfer", Tata McGraw-Hill edition. 1997
3. W.L. McCabe, J.C.Smith, P.Harriott, "Unit Operations of Chemical Engineering", sixth edition, McGraw Hill Company, 2001
4. M.Necati Ozisik, "Heat Transfer: A Basic Approach", International Edition, McGraw-Hill Company, 1985
5. Sadık Kakaç, A. E. Bergles, F. Mayinger, "Heat Exchangers-Thermal Hydraulic Fundamentals and Design", Hemisphere Pub. Corp., Washington
6. J.P.Gupta, "Heat Exchanger Design- A practical look" C.S. Enterprises, Delhi
7. R.K. Shah, A.D.Kraus, D.Metzger (Eds.), "Compact Heat Exchangers: A Festschrift for A.L. London" Hemisphere Pubs. Corp., 1990

FOR APPROVAL

Course Faculty  CC- Chairperson  HOD 

(RUBEN SUDHAKAR.D.) (Dr. A. ARUNAGIRI) (Dr. N. ANANTHARAMAN)