



DEPARTMENT OF CHEMICAL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI-620015

COURSE PLAN – PART I			
Course Title	CHEMICAL PROCESS DESIGN		
Course Code	CL604	No. of Credits	4
Course Code of Pre-requisite subject(s)	Students should have strong basics on Momentum, Heat and Mass transfer and Chemical Reaction Engineering		
Session	Jan. 2022	Section (if, applicable)	Not Applicable
Name of Faculty	Dr.P.Sivashanmugam	Department	Chemical Engineering
Email	psiva@nitt.edu	Telephone No.	04312503106
Name of Course Coordinator(s) (if, applicable)	Dr.P.Kalaichelvi		
E-mail	meera@nitt.edu	Telephone No.	04312503101
Course Type	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		
Syllabus (approved in BoS)			
<p>Design and sizing of Shell and Tube Heat exchangers with types and arrangements of fluids, plate type heat exchanger, Condensers -vertical and Horizontal.</p> <p>Design and sizing of Single and Multiple Effect Evaporators-Short tube, long tube etc. Design of storage tank and supports: horizontal storage tank, Design of Saddle, Skirt, and Lug supports.</p> <p>Design of Reaction vessel with and without cooling coil, Normal and High Pressure vessel, Design and sizing of mass transfer equipment: Design of distillation column, Multi-component distillation with reboiler, Absorption tower both plate as well as packed type, cooling tower and extraction columns.</p> <p>Design and sizing of drier, and Crystallizer. Design and sizing of phase separation equipment-filter press, Centrifuge, Cyclone (Hydro as well as air).</p> <p>All the above design should be taught in a process Integration approach with special material and energy conservation.</p> <p>REFERENCE BOOKS</p> <ol style="list-style-type: none"> 1. K.Q.Kern, <i>Process Heat transfer</i>, McGraw-Hill,1965. 2. Coulson and Richardson, <i>Chemical Engineering Vol.VI</i>, Pergamon Press,1983. 3. S.B.Thakore and B.I.Bhatt, <i>Introduction to Process Engineering and Design</i>, McGraw-Hill, 2009. 4. Couper, R James, <i>Chemical process equipment design</i>, Elsevier, 2012 3rd Edition. 			

5. Perry, *Chemical Engineer's Hand book*, McGraw-Hill, 2009.
6. McCabe and Smith, *Unit operation of Chemical Engineering*, McGraw-Hill, 2008.
7. Christie John Geankopolis, *Transport process and Separation Process*, Fourth Edition, PHI, 2004.

COURSE OBJECTIVES

- (i) To understand process design of heat transfer equipment.
- (ii) To understand process design of mass transfer equipment.
- (iii) To understand process design of phase separation equipment and design various supports.
- (iv) To get an idea on troubleshooting and operation all chemical process equipment.
- (v) To get an idea on design of new chemical plant by using the studied design tools.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
get awareness on advances in process engineering design of many heat transfer equipment and reactors with process integration approach.	PO1 to PO10
get awareness on advances in process engineering design of many mass transfer equipment with process integration approach.	PO1 to PO4, PO6, PO8 to PO10
have awareness on advances in process engineering design of many mechanical operation equipment and supports with process integration approach	PO1 to PO7, PO9 to PO11
analyse and troubleshoot existing unit operation equipments in a Chemical Process plant	PO1 to PO3, PO7, PO9, PO11

COURSE PLAN – PART II

COURSE OVERVIEW

This course deals with advances in process design of chemical engineering process equipments

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1	Design and sizing of shell and tube heat exchangers with types and arrangements of fluids	PPT presentation
2	Week 2	Plate type heat exchanger	PPT presentation
3	Week 3	Condensers-vertical and horizontal	PPT presentation
4	Week 4	Design and sizing of single and multiple effect evaporators – short tube, long tube, etc.	PPT presentation
5	Week 5	Design of reaction vessel with and without cooling coil	PPT presentation
6	Week 6	Normal and high pressure vessel	PPT presentation
7	Week 7	Design of distillation column multicomponent distillation with reboiler	PPT presentation

8	Week 8	Adsorption tower both plate as well as packed type	PPT presentation
9	Week 9	Design and sizing of dryer and crystallizer	PPT presentation
10	Week 10	Design and sizing of phase separation equipment – filter press	PPT presentation
11	Week 11	Centrifuge	PPT presentation
12	Week 12	Cyclone	PPT presentation
13	Week 13	Process integration approach with special material and energy conservation	PPT presentation
14	Week 14	Process integration approach with special material and energy conservation and Guest lecture	PPT presentation

Semester Examination

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	1 st Assessment written mode	Week 5	1	25
2	2 nd Assessment (written mode)	Week 10	1	25
3	Assignment /Viva-voce	Week 1 to 12	1	20
CPA	Compensation Assessment*	Week 11	1	25
5	Final Assessment *	Week 15	2 Hours	30

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

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

Course exit survey may be conducted at end of the end of the course. Beside this students feedback during class committee meeting before first and second assessment will be considered in a positive way and delivered in a corrective way

COURSE POLICY (preferred mode of correspondence with students, policy on attendance, compensation assessment, , academic honesty and plagiarism etc.)

MODE OF CORRESPONDENCE (email/ phone etc) : Email :psiva@nitt.edu, cell :9442115394

ATTENDANCE :

- 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.

COMPENSATION ASSESSMENT :

Student who have missed the first or second or both the Assessment test(s) can register for the Re-assessment which shall be conducted soon after the second one, but before the End semester assessment. The weightage for Re-assessment is 20% and time duration is 1 hour.

The portions for Retest includes both the cycle test(s) portions.

ACADEMIC HONESTY & 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

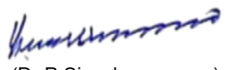

1. Mandatory classes (after the semester examinations of the current session) should be attended by the students, whose attendance falls below 75% and but above 60% in this subjected concerned.
2. Students who have less than 60% of attendance have to redo the subject
3. Students who have failed in the semester examination with F Grade, those completed mandatory classes and those have missed the end semester examination can take reassessment (supplementary examination).
4. The passing minimum is 40

FOR APPROVAL

Course Faculty _____ **CC-Chairperson** _____ **HOD** _____

All students shall be permitted to appear for end semester examination / final assessment. Attendance shall not be a criterion for preventing a student from appearing for final assessment. The final assessment shall not exceed 2 hour duration. Any online assessment, including the final one, shall not carry a weightage of more than 30%. In the Class Committee, it is decided to adjust the weightage amongst the internal assessments (IA) in such a way the total weightage attributed to IA is 70%. The details are given in course assessment methods

FOR APPROVAL

 (Dr.P.Sivashanmugam) Course Faculty	 CC-Chairperson	 HoD
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