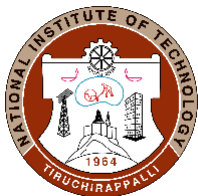




DEPARTMENT OF CHEMICAL ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	MTech and Chemical Engineering		
Course Title	SCALE -UP METHODS		
Course Code	CL 612	No. of Credits	3
Course Code of Pre-requisite subject(s)	-		
Session	July 2020	Section (if, applicable)	-
Name of Faculty	Dr Kartikeya Shukla	Department	Chemical Engineering
Official Email	shukla@nitt.edu	Telephone No.	
Name of Course Coordinator(s) (if, applicable)	Dr. K. M. Meera Sheriffa Begum		
Official E-mail	meera@nitt.edu	Telephone No.	+91 - 431 - 2503109
Course Type (please tick appropriately)	Programme Elective (PE)		
Syllabus (approved in BoS)			
<p>Principals of Similarity, Pilot Plants & Models: Introduction to scale-up methods, pilot plants, models and principles of similarity, Industrial applications.</p> <p>Dimensional Analysis and Scale-Up Criterion: Dimensional analysis, regime concept, similarity criterion and scale up methods used in chemical engineering.</p> <p>Scale-Up of Mixing and Heat Transfer Equipment: Typical problems in scale-up of mixing equipment and heat transfer equipment</p> <p>Scale-Up of Chemical Reactors: Kinetics, reactor development & scale-up techniques for chemical reactors.</p> <p>Scale-Up of Distillation Column & Packed Towers: Scale-up of distillation columns and packed towers for continuous and batch processes</p> <p>Reference:</p> <ol style="list-style-type: none"> 1. Johnstone and Thring, Pilot Plants Models and Scale-up methods in Chemical Engg., McGraw Hill, New York, 1962. 2. Marko Zlokarnik, Dimensional Analysis and Scale-up in Chemical Engg., Springer Verlag, Berlin, Germany, 1986. 3. Donald G.Jordan, Chemical Process Development (Part 1 and 2), Interscience Publishers, 1988. 			



COURSE OBJECTIVES	
To learn the step-by-step process for developing a successful scaling up strategy.	
MAPPING OF COs with POs	
Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. Know the industrial applications of scale up methods.	1,2,3
2. Perform dimensional analysis of chemical engineering problems and can be able to establish a scale up criterion.	1,2,3,4,6,8,9,10
3. Solve problems in scale-up of mixing equipment and heat transfer equipment.	1,2,3,4,5,6,7,9,10,11
4. Solve scale-up of chemical reactors, distillation columns and packed column.	1,2,3,4,5,6,7,8,9,10,11.

COURSE PLAN – PART II			
COURSE OVERVIEW			
<p>Through the course, the students will get familiar with different techniques and basic methods involved in scale up methods. They would also gain knowledge about scaling up of basic chemical operations involved in chemical industries which includes the chemical reactors, distillation columns, packed columns. This course will brush up the concepts and principles involved in basic Chemical Engineering. The course will also give some insights about the frequently used dimension less numbers in studying the behaviour of process.</p>			
COURSE TEACHING AND LEARNING ACTIVITIES			(Add more rows)
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1	Principals of Similarity, Pilot Plants & Models: Introduction to scale-up methods.	PPT, Online
2	Week 2	Pilot plants, models and principles of similarity, Industrial applications.	PPT, Online
3	Week 3	Dimensional Analysis and Scale-Up Criterion: Dimensional analysis,	PPT, Online
4	Week 4	Regime concept	PPT, Online



5	Week 5	Similarity criterion and scale up methods used in chemical engineering.	PPT, Online
6	Week 6	Scale-Up of Mixing Equipment: Typical problems in scale-up of mixing equipment	PPT, Online
7	Week 7	Scale-Up of Heat Transfer Equipment: Typical problems in heat transfer equipment	PPT, Online
8	Week 8	Scale-Up of Chemical Reactors: Kinetics.	PPT, Online
9	Week 9	Scale-Up of Chemical Reactors: Reactor development & scale-up techniques for chemical reactors.	PPT, Online
10	Week 10	Scale-Up of Distillation Column Scale-up of distillation columns	PPT, Online
11	Week 11	Scale-Up of Packed Towers: and packed towers	PPT, Online
12	Week 12	Scale-Up of Packed Towers: for continuous and batch processes	PPT, Online

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assesment I (Assignment)	Week 4		10
2	Assesment II	Week 6	1 hour	25
3	Assesment III (Assignment)	Week 8		10
4	Assesment V	Week 10	1 hour	25
CPA	Compensation Assessment*	Week 11	1 hour	25
5	Final Assessment *	Week 13	2 hour	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 POLICY (including compensation assessment to be specified)

The course syllabus can be covered within 12 weeks. There are 6 assessments will be conducted to evaluate the student performance. Compensation assessment can be conducted before the final exam date.

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



FOR APPROVAL

Kartikaya

[Signature]

[Signature]

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.