

DEPARTMENT OF CHEMICAL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B.TECH, CHEMICAL ENGINEERING		
Course Title	NEW SEPARATION PROCESSES		
Course Code	CLPE14	No. of Credits	3
Course Code of Pre-requisite subject(s)	CLPC20		
Session	July 2018	Section (if, applicable)	A / B
Name of Faculty	Dr.Nagajyothi Virivinti	Department	Chemical Engineering
Email	jyothi@nitt.edu	Telephone No.	09985329988
Name of Course Coordinator(s) (if, applicable)			
E-mail		Telephone No.	
Course Type	<input type="checkbox"/> Core course <input checked="" type="checkbox"/> Elective course		
Syllabus (approved in BoS)			
<p>Review of Conventional Processes, Recent advances in Separation Techniques based on size, surface properties, ionic properties and other special characteristics of substances, Process concept, Theory and Equipment used in cross flow Filtration, cross flow Electro Filtration, Surface based solid –liquid separations involving a second liquid.</p> <p>Sorption Techniques: Types and choice of adsorbents, Normal Adsorption techniques, chromatographic techniques, types and Retention theory mechanism Equipment and commercial processes, Recent advances and economics, Molecular Sieves.</p> <p>Types and choice of Membranes, Plate and Frame, tubular, spiral wound and hollow fiber Membrane Reactors and their relative merits, commercial, Pilot Plant and Laboratory Membrane permeators involving Dialysis, Reverse Osmosis, Nanofiltration, Ultra filtration and Micro filtration, Ceramic-Hybrid process and Biological Membranes</p> <p>Ionic Separation: Controlling factors, Applications, Equipments for Electrophoresis, Dielectrophoresis, Electro Dialysis and Ion -Exchange, Commercial processes.</p> <p>Other Techniques: Separation involving Lyophilisation, Pervaporation and Permeation Techniques for solids, liquids and gases, zone melting, Adductive Crystallization, other Separation Processes, Supercritical fluid Extraction, Oil spill</p>			

Management, Industrial Effluent Treatment by Modern Techniques
REFERENCE BOOKS
1. H. M. Schoen, "New Chemical Engineering Separation Techniques", Inter Science Publications, New York, 1972.
2. Nakagawal, O. V., "Membrane Science and Technology" Marcel Dekkar, 1992
3. B.Sivasankar, "Bioseparations –Principles and Techniques", Prentice Hall of India Pvt.

COURSE OBJECTIVES
<ol style="list-style-type: none"> 1. This subject deals with the application of the science and engineering science that you have learned to the separation of chemical and wastewater. 2. To understand how separation work, and to further develop your ability to apply basic principles to the solution of specific problems

COURSE OUTCOMES (CO)	
Course Outcomes	Aligned Programme Outcomes (PO)
1. know the various conventional processes and non -conventional for liquid separation.	PO1, PO2, PO3, PO5, PO8, PO9, PO11, PO12
2. able to select appropriate separation technique by adsorption and chromatographic for intended problem	
3. able to understand membrane separation process for multi-component mixtures, liquids and gas from industry and process.	
4. understand controlling factors, Applications, Equipment for Electrophoresis and ionic separation	
5. able to design separation system for solids, liquids and gases and find effective solution of intended problem.	

COURSE PLAN – PART II			
COURSE OVERVIEW			
To identify about the kind of separation processes in general and novel separations are integral part of any process chemical industries. To understand the concepts behind advanced separation processes involving various mechanical and mass transfer operations.			
COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	4	Review of Conventional Processes, Recent advances in Separation Techniques based on size, surface properties, ionic properties and other special characteristics of substances	Presentation

2	3	Process concept, Theory and Equipment used in cross flow Filtration, cross flow Electro Filtration	Presentation
3	1	Surface based solid liquid separations involving a second liquid.	Presentation
4	2	Sorption Techniques: Types and choice of adsorbents, Normal Adsorption techniques,	Presentation
5	4	Chromatographic techniques, types and Retention theory mechanism Equipment and commercial processes, Recent advances and economics, Molecular Sieves.	Presentation
6	3	Types and choice of Membranes, Plate and Frame, tubular, spiral wound and hollow fiber Membrane Reactors and their relative merits	Presentation
7	2	commercial, Pilot Plant and Laboratory Membrane permeators involving Dialysis, Reverse Osmosis	Presentation
8	3	Nanofiltration, Ultra filtration and Micro filtration, Ceramic-Hybrid process and Biological Membranes	Presentation
9	4	Ionic Separation: Controlling factors, Applications, Equipments for Electrophoresis,	Presentation
10	3	Dielectrophoresis, Electro Dialysis and Ion Exchange, Commercial processes	Presentation
11	4	Other Techniques: Separation involving Lyophilisation, Pervaporation and Permeation Techniques for solids, liquids and gases	Presentation
12	5	zone melting, Adductive Crystallization, other Separation Processes, Supercritical fluid Extraction, Oil spill Management, Industrial Effluent Treatment by Modern Techniques	Presentation

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment-I	After 14 th contact hour	One hour	20%
2	Assignment	After first assessment		10%

3	Assessment-II	After 30 th contact hour	One hour	20%
4	MCQ test		30 min	10%
5	Compensation Assessment	After 35 th contact hour	One hour	20%
6	Final Assessment *		Two hours	40%

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

Feedback will be taken two times, one after the class test and the other at the end of the semester.

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

MODE OF CORRESPONDENCE (email/ phone etc):

Students may contact the faculty over mail (jyothi@nitt.edu) or over whatsapp (9985329988)

COMPENSATION ASSESSMENT POLICY:

All Assessments are compulsory. If any students fail to appear any of the assessments 1 and 2 due to genuine reason, students can appear for the compensation assessment. If the student fails to attend both the assessments, he can appear for the CPA. However, the other assessment marks will be given as zero.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- **At least 75% attendance in each course is mandatory.**
- **A maximum of 15% shall be allowed under On Duty (OD) category like placements or internships.**
- Students who have attendance between 50 to 60% need to appear for CPA and score minimum 25% of marks, failing which students has to do redo course.
- Students with **less than 50% of attendance** shall be prevented from writing the final assessment and should do redo course.

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

FOR APPROVAL

Course Faculty *V. V. Rajitha* CC-Chairperson *[Signature]* HOD *[Signature]*