DEPARTMENT OF CHEMICAL ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Course Title	PROCESS MODELLING AND SIMULATION		
Course Code	CL 603	**No. of Credits**	3
Course Code of Pre-requisite subject(s)			
Session	July 2018	**Section (if, applicable)**	
Name of Faculty	Dr.Nagajyothi Virivinti	**Department**	Chemical Engineering
Email	jyothi@nitt.edu	**Telephone No.**	9985329988
Name of Course Coordinator(s) (if, applicable)			
E-mail	jyothi@nitt.edu	**Telephone No.**	09985329988
Course Type	☑ Core course	☐ Elective course	

Syllabus (approved in BoS)

Introduction to process modeling -a systematic approach to model building, classification of models, Conservation principles, thermodynamic principles of process systems.

Development of steady state and dynamic lumped and distributed parameter models based on first principles. Analysis of ill-cnditioned systems, Models with stiff differential equations.

Development of grey box models, Empirical model building, Statistical model calibration an d validation, Introduction to population balance models, multi-scale modeling.

Solution strategies for lumped parameter models and stiff differential equations, Solution methods for initial value and boundary value problems. Euler's method. R-K methods, sooting method, finite difference methods –predictor corrector methods.

Solution strategies for distributed parameter models. Solving parabolic, elliptic and hyperbolic partial differential equations. Introduction to finite element and finite volume methods

COURSE OBJECTIVES

To develop mathematical model and dynamic simulator for chemical processes

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
1. develop process models based on conservation principles and process data	PO1, PO2

2. apply computational techniques to solve the process models	**PO1, PO2, PO3, PO4, PO6, PO8, PO9, PO10**
3. apply different methods for parameters estimation	**PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO9, PO10, PO11**
4. simulate process models using MATLAB/SCILAB	**PO1, PO2, PO3, PO5, PO7, PO9, PO11**

COURSE PLAN – PART II

COURSE OVERVIEW

This course gives you an introduction to modeling methods and simulation tools for a wide range of natural phenomena. The different methodologies that will be presented here can be applied to very wide range of processes.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	6hours	Introduction to process modeling -a systematic approach to model building, classification of models, Conservation principles, thermodynamic principles of process system	Presentation, chalk and talk
2	7 hours	Development of steady state and dynamic lumped and distributed parameter models based on first principles. Analysis of ill-conditioned systems, Models with stiff differential equations.	Presentation, chalk and talk
3	6 hours	Development of grey box models, Empirical model building, Statistical model calibration and validation, Introduction to population balance models, multi-scale modeling.	Presentation, chalk and talk
4	8hours	Solution strategies for lumped parameter models and stiff differential equations, Solution methods for initial value and boundary value problems. Euler's method. R-K methods, shooting method, finite difference methods –predictor corrector methods.	Presentation, chalk and talk
5	7 hours	Solution strategies for distributed parameter models. Solving parabolic, elliptic and hyperbolic partial differential equations. Introduction to finite element and finite volume methods	Presentation, chalk and talk

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment-I	After 13th contact hour	One hour	20%
2	Assignment			10%
3	Test			10%
4	Assessment-II	After 30th 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 Assessment-I, the other at the end of the semester.

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

MODE OF CORRESPONDENCE (email/ phone etc)

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

ATTENDANCE

- A uniform attendance policy for all courses is recommended. **At least 75% attendance in each course is mandatory.**
- Students with **less than 75% of attendance** shall be prevented from writing the final assessment and **shall be awarded 'V' grade.**

COMPENSATION ASSESSMENT POLICY

All the assessments are compulsory. I any student fail to appear the assessment; marks will be given as zero.

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 constituted with the 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 policy against academic dishonesty shall be applicable for the current batches also.

ADDITIONAL INFORMATION

FOR APPROVAL

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