NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

Department of Chemical Engineering

COURSE OUTLINE							
Course Title	SAFETY IN CHEMICAL INDUSTRIES						
Course Code	CLPC22	No. of Credits	L	T	P	C	
			3	0	0	3	
Department	Chemical Engineering	Faculty	Dr. M. Arivazhagan				
Pre-requisites Course Code	CLPC16						
Course Coordinator(s) (if, applicable)	---						
Other Course Teacher(s)/Tutor(s) E-mail	---	Telephone No.	0431-2503111				
Course Type	Core course						

COURSE OVERVIEW

It is imperative that, the engineers working in chemical industries should have a thorough understanding of the industrial safety procedures and protocols, as they have to deal with dangerous chemicals and scenarios on a daily basis. The aim of this course is to provide students with an understanding of various aspects of industrial safety, hazards, their prevention, and knowledge of the governing legislations.

COURSE OBJECTIVES

i) To provide a general idea about safety in chemical industries.
ii) To imbibe in students a culture of safer practices.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
On completion of the course, the students are expected to be familiar with,	
1. Hazards in chemical industries and their mitigation	PO1, PO2, PO4, PO8, PO10, PO11, PO12
2. Safety aspects in plant site selection, design & layout and psychological approach to process safety	PO1, PO3, PO4, PO5, PO6, PO7, PO8, PO10, PO11, PO12
3. Occupational diseases and their prevention, process control for process safety	PO1, PO3, PO4, PO5, PO6, PO8, PO10, PO11, PO12
4. Case studies of industrial disasters and risk management methodologies	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12

5. Legislations for safety in chemical industries & environmental protection, economics of providing safety	PO3, PO4, PO6, PO8, PO10, PO12

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1	Week 1 (2 contact hours)	Introduction: Role of chemical engineer in process industries	Lecture C&T/ PPT
2	Week 2 (3 contact hours)	Industrial Hazards –.Fire hazards and it's prevention, Radiation hazards and control of exposure to radiation	
3	Week 3 (3 contact hours)	Mechanical hazards, Electrical hazards, Construction hazards.	
4	Week 4 (3 contact hours)	Psychology, hygiene & other industrial hazards: Industrial psychology, Industrial hygiene	
5	Week 5 (3 contact hours)	Housekeeping, Industrial lighting and ventilation, Industrial noise	
6	Week 6 (3 contact hours)	Occupational diseases and prevention methods, Personal protective equipments; Site selection and plant layout,	
7	Week 7 (1 hour cycle test)	**Assessment - 1** Written test	--
	(2 contact hours)	Instrumentation and control for safe operation	Lecture C&T/ PPT
8	Week 8 (2 contact hours)	Pressure, Temperature and Level controllers	
9	Week 9 (3 contact hours)	Risk Management and Hazard Analysis	Lecture C&T/ PPT
10	Week 10 (2 contact hours)	Steps in risk management, Risk analysis using HAZOP, FTA etc.	
11	Week 11 (3 contact hours)	Case studies pertaining to chemical industries	
12	Week 12 (2 contact hours)	Bhopal gas tragedy, causes, affects & lessons learnt, other cases	
	(1 hour cycle test)	**Assessment - 2** Written test	--
13	Week 13 (3 contact hours)	Economics of safety – Financial costs to individual, family, organization and society	Lecture C&T/ PPT
14	Week 14 (3 contact hours)	Legal framework for safety and environment: The Factories Act.	
15	Week 15 (2 contact hours)	The Environmental (Protection) Act	

16	Week 16 (2 contact hours)	The Workmen's compensation Act, The Employee State Insurance Act.	
	(1 hour cycle test)	**Compensation Assessment (CPA)** Written test	--
17	Week 17 Date decided by class committee/ Dean office	**End Semester Examination** Written test	--

C & T : Chalk and Talk and PPT : Power Point

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment - 1 Written test	Week 7	60 Minutes	20
2	Assessment - 2 Written test	Week 12	60 Minutes	20
3	Project based Assignment	During the regular class hours – Details will be informed later		10
4	Compensation Assessment (CPA) Written test	Week 16	60 Minutes	20
5	End Semester Examination	Week 17	180 Minutes	50

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. Sam Mannan, Frank P. Lees, "Lees' Loss Prevention in the Process Industries: Hazard Identification, Assessment and Control", 4th Edition, Butterworth-Heinemann, 2005.
2. H. H. Fawcett and W. S. Wood, "Safety and Accident Prevention in Chemical Operation", 2nd Edition, Wiley Interscience, 1982.
3. Guide for Safety in the Chemical laboratory, 2nd Edition, 1977, Manufacturing Chemists Association. Van Nostrand Reinhold Company, New York.
4. Industrial Safety and Laws, 1993, by Indian School of Labour Education, Madras.
5. Daniel A. Crowl and Joseph F. Louvar, "Chemical Process Safety, Fundamentals with Applications", 2nd Edition, Prentice Hall, Inc. ISBN 0-13-018176-5.
6. Lecture materials by the course faculty

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

- Feedback from the students during class committee meetings
- Anonymous feedback through questionnaire

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)
• 75% attendance is mandatory. Any student, who fails to maintain 75% and having above 50% attendance need to appear for the compensation assessment (CPA) and score minimum 30% marks in the CPA for attending the end semester examination. Students who maintained less than 50% will redo the course. • Those who indulge in malpractice such as copying, plagiarism shall have to redo the course. • Those who are absent for any of the assessment tests (S. No. 1 or 2) on genuine grounds shall be given an opportunity only once for the retest with the prior permission of the concerned faculty member. The retest shall be conducted before the end semester exam and the portions will be up to Cycle Test II. • The minimum marks for passing this course and grading pattern will adhere to the regulations of the Institute. • Those who fail in the course can appear for the supplementary exam. The total marks will be 100. • Any misbehavior, indiscipline in the classroom/ exam hall will be dealt with seriously. In the worst case, the departmental disciplinary committee is empowered to debar the student from the course.
ADDITIONAL COURSE INFORMATION
• Queries may be emailed to the Course Coordinator directly at ariva@nitt.edu • The Course Coordinator can be contacted in person for clarifications on a mutually convenient time.
FOR SENATE'S CONSIDERATION
Course Faculty M. A. (Dr. M. ARIVAZHAGAN) **CC-Chairperson** (Dr. K. N. Sreeram) **HOD** 21/8/2012