

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
FIRST SEMESTER 2022-2023
Course Handout (Part II)

Date: 29-08-2022

In addition to part-I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No. : CHE F413
Course Title : Process Plant Safety
Instructor in Charge : Afkham Mir

1. Objective and Learning Outcomes

Plant safety is an integral part of any process industry. Knowledge of plant safety is essential to prevent accidents in the plant, thereby having a direct impact on process economics. A chemical engineer is expected to have a thorough understanding of various aspects of plant safety, including hazard analysis, safety regulations and practices, risk assessment and management, etc. This course deals with the application of fundamentals of chemical process safety. It introduces the role of safety in process industries, concepts of chemical hazards, risk assessment methods etc. Various cases studies of industrial accidents are analyzed in this course.

At the end of the course, the student should be able to:

- Describe the engineering aspects of process plant safety
- Define the physical and chemical agents that affect safety at the workplace and the effects of occupational hazards on the health of workers
- Identify and classify hazardous substances and define precautions for their handling and storage
- Define the basic steps involved in risk assessment and apply this to various case studies
- Describe the various steps and procedures of a safety audit

2. Text Books:

T1: Fulekar M.H. Industrial Hygiene and Chemical Safety. Publisher: I.K. International, New Delhi. 2006. Library code: 363.179, FUL-M.

3. Reference Books:

R1: Sanders R.E., "Chemical Process Safety: Learning from case Histories", Butterworth-Heinemann (Elsevier), Boston and New Delhi, 2005.

R2: Crowl D.A. and Louvar J.F., "Chemical Process Safety" Prentice Hall International Series in the Physical and Chemical Engineering Sciences. Third Edition. 2011

4. Course Plan:

Lecture No.	Topics to be covered	Learning Objectives	Chapter in the Text Book
1-2	Introduction	Role of safety, Accident and loss statistics	Ch 1 : R2
3-7	Industrial hygiene	Chemical Hazards and worker safety, Identification evaluation and control of occupational conditions	Ch 1-2 : T1
8-11	Physical and chemical	To study the hazards and worker safety in regards	Ch 3-4 : T1

	stresses	to noise, vibration, heat, chemicals and manufacturing processes	
12-13	Occupational Diseases	To study afflictions that arise due to effects of physical, chemical, biological and psychological hazards	Ch 7 : T1
14-16	Personal protective equipment	Introduction, requirements, selection guidelines and study of various protective equipment	Ch 9 : T1
17	Introduction to chemical safety	Chemical plant layout and legal requirements	Ch 10: T1
18-22	Hazardous Chemicals and Substances	Classification, storage and handling. Fire Precautions.	Ch 11-12: T1
23-25	Safety in Explosives and Pipeline Safety	Classification of explosives. Risk assessment, stress corrosion cracking, pipelines-spills.	Ch 13-14: T1
26-27	Chemical process safety	Introduction, hazardous chemical processes, reactors and reaction hazards and necessary precautionary measures	CH 15: T1
28-30	Risk assessment	Risk assessment procedures and typical operational practices	CH 16: T1
31-33	Hazard Identification	Hazard and operability studies	Ch 17: T1, R1
34-36	Emergency preparation and Accident investigation	On-site and off-site emergency plan and infrastructure, Learning from accidents, Layered investigation, Aids for diagnosis and recommendations	Ch 18: T1
37-38	Safety audit	Introduction, essentials, requirements, programs and procedures	Ch 19: T1
39-42	Case studies of major disasters due to safety violations	Chernobyl disaster, Bhopal disaster, recent oil spills etc.	R1, R2

5. Evaluation Scheme:

Component	Duration (minutes)	Weightage (%)	Date & Time	Nature of Component
Mid-Sem Exam	90	30	05/11 3.30 - 5.00PM	CB
Class Test (2)	30	20	Evenly spaced throughout the semester	OB
Assignment (1)	TBA	10		OB
Comprehensive Exam.	180	40	31/12 FN	CB

6. **Chamber Consultation Hour:** Will be announced in the class (Chamber: D-319)
7. **Notices:** Notices concerning the course will be displayed on the CMS website
8. **Make-up Policy:** Make-up will be granted only for genuine cases with valid justification and only with prior permission of Instructor-in-charge.
9. **Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge
CHE F413