Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Science College
Semester-2(M.SC.IC.)

Subject: Industrial Safety – II-MSCIN12510

Type of course: Major

Prerequisite: Industrial safety is critical to ensuring the well-being of workers, preventing accidents, and maintaining compliance with regulations in various industries, such as manufacturing, construction, petrochemicals, and more. Before working in an industrial environment, individuals must be equipped with fundamental safety knowledge and skills.

Rationale: The most fundamental reason for industrial safety is to protect workers from potential hazards in the workplace. Workers in manufacturing plants, construction sites, laboratories, and chemical facilities are exposed to various dangers, such as toxic chemicals, machinery and environmental risks.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
4	0	0	4	60	30	10	00	50	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End. Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Unit No.	Course content	Hrs	% Weightage
1	**Principle of Industrial safety:** Introduction, Knowledge of material, Dangerous properties of chemicals, Hazards due to chemicals, Major considering factor for safety, Effects of chemicals on human body, Control of diseases due to chemical effects, Explosive Act (1884 & 1978), Petroleum Act (1934), Gas cylinder rule (1981).	15	25
2	**Engineering Control of Chemical Plant Hazards:** Industrial plant layout, Ventilation and Lighting, Vessels and Pipelines, Storage-Handling and Transportation, Electrical system, Instrumentation, Fire prevention, Personal protective devices, Laboratory safety, Emergency Procedures.	15	25
3	**Safety and Maintenance:** Introduction, Classification of safety department works, Safety equipments, Hazard detection equipments (Gas detection device-Gas detection pump, Gas detection tube, Explosive meter, Oxygen meter, Personal gas monitor, Radiation meter), Fire fighting equipments (Fire fighting bottles of dry chemical powder, Carbon dioxide gas & Foam).	15	25
4.	**Environmental Impact Assessment (EIA) and Auditing** Guidelines of EIA. Disaster management plant. Environmental Audit – ISO -14000. Bio-diversity and its importance to the society.	15	25
	Total	60	100

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1.	**Hazard Identification:** Students will prepare a safety report outlining, Identified hazards and their dangerous properties, Preventive controls and safety equipment required. Recommendations for improving safety and reducing risks. prepared report and upload it on GMIU Web portal.	10

2.	**Group Activity** Divide students into small groups. Assign each group a specific scenario involving a gas leak or fire. Students will: Use gas detection equipment to identify the type and concentration of hazardous gases. Choose the correct firefighting equipment, and it's working prepared full report and upload the details on the GMIU Web portal.	10
3.	**Chemical Safety Regulations Simulation** Students need to prepare a detailed report on any one Explosives Act (1884 & 1978), the Petroleum Act (1934), Gas Cylinder Rule (1981) and upload it to GMIU web Portal.	10
4.	**Environmental Impact Assessment (EIA)** Provide students with an introduction to EIA: Briefly explain the guidelines of Environmental Impact Assessment (EIA) and environmental auditing (ISO 14000). Discuss its significance in identifying the environmental effects of industrial activities and ensuring compliance with environmental laws. With templates or instructions to create paper models and upload them to GMIU web Portal.	10
5.	**Chemistry in the News** Students find out recent news articles related to chemistry. They can explore topics like new discoveries, environmental issues, or advancements in technology. Make a report and upload it to the GMIU Web Portal.	10
Total		**50**

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks **(Revised Bloom's Taxonomy)**						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	30%	30%	20%	00	00

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Understanding the effects of chemicals on the human body.
CO2	Aware to utilize personal protective devices (PPE) to protect workers from chemical exposure.
CO3	Identify and use hazard detection equipment.
CO4	Implement emergency procedures in an industrial accidents or natural disasters.

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

[1] A Text Book of Environmental Pollution and Control. By Dr. H. S. Bhatt.
[2] Environmental pollution analysis by S. M. Khopkar.
[3] General oceanography: An introduction by G. Dietrich.
[4] Fundamental concept of Environmental chemistry by G. S. Sodhi,
[5] Plant design economics for chemical engineering by Pater & Timmer