



Course Syllabus
Gyanmanjari Science College
Semester-I(M.Sc.)

Subject: Laboratory safety and management- MSCMT11505

Type of course: Minor

Prerequisite: To understand hazardous chemicals, their components, and common laboratory equipment is essential for students to ensure safety and proper handling in the laboratory.

Rationale: Students will learn about personal protective equipment and hazardous chemicals. They will also learn about biosafety measures for protection against infectious agents, as well as safety protocols for the storage of hazardous materials.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
3	0	0	3	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.

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	Presentation Students have to prepare a presentation on given topic and upload on GMIU web portal.	10
2	HEPA vs ULPA Filters in Microbial Air Filtration Students have to prepare report on: A Comparative Analysis of HEPA and ULPA Filters in Microbial Air Filtration for Laboratory and upload on GMIU web portal.	10
3	Assignment Students have to write an assignment on given topic and upload on GMIU web portal.	10



4	Safety Inspection Create a safety checklist for a specific piece of laboratory equipment, outlining inspection and operation procedures and upload on GMIU web portal.	10
5	Quiz Faculty will provide the students a set of MCQs according to the learning objective of the course and students will answer it individually on GMIU web portal.	10
Total		50

Course Content:

Unit No	Course content	Hrs	% Weightage
1	Chapter: 1: Introduction to Laboratory Safety and Biosafety <ul style="list-style-type: none"> Introduction to Laboratory Safety: Importance, objectives, and regulatory bodies Biosafety Levels (BSL 1–4): Classification, facility requirements, containment Laboratory Design: Safe layout for clinical and research labs Personal Protective Equipment (PPE) and Lab Attire Safe Handling of Biological, Chemical, and Radiological Materials 	15	25
2	Chapter: 2: Fire, Chemical, and Waste Safety Management <ul style="list-style-type: none"> Fire Safety and Emergency Response Procedures Waste Segregation: Categories of biomedical waste and disposal methods Chemical Hygiene Plan: Labeling, storage, and MSDS usage Biomedical Waste Disposal: Legal guidelines and on-site protocols First Aid and Management of Laboratory Accidents 	15	25
3	Chapter: 3: Risk Management and Safety Protocols <ul style="list-style-type: none"> Risk Assessment: Identification, evaluation, and mitigation of hazards Accident Reporting and Root Cause Analysis Electrical and Equipment Safety: Usage protocols and maintenance checks SOPs and Laboratory Safety Audits Training and Competency Development in Lab Safety 	15	25



4	Chapter: 4: Ethics, Quality, and Regulatory Standards	15	25
	<ul style="list-style-type: none"> Ethical Issues in Laboratory Practice and Research Laboratory Information Management Systems (LIMS) Quality Management Systems (QMS): Concepts and documentation Accreditation Standards: NABL, ISO 15189, Good Laboratory Practices (GLP) Continuous Education and Professional Safety Culture 		

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%	40%	30%	10%	-	-

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	Understand biosafety levels, lab design, and proper PPE use to ensure a safe laboratory environment.
CO2	Gain the basic knowledge of standard safety rules for fire prevention, chemical handling, and biomedical waste management as per regulations.
CO3	Acquired knowledge of safety procedures and risk assessment methods to prevent accidents in the lab.
CO4	Adopt ethical practices, quality systems, and regulations to ensure lab safety and meet accreditation standards.

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] Industrial Hygiene & Chemical Safety - M.H. Fulekar: I. International Publishing House, New Delhi.
- [2] Fundamentals of Occupational Safety and Health, Mark A. Friend, James P. Kohn, Government Institutes, 2010
- [3] Handbook of occupational safety and health, Louis J. DiBerardinis, John Wiley, 1999
- [4] Industrial Hygiene Evaluation Methods, Micheal S. Bisesi, CRC Press, 2003
- [5] Occupational safety management and engineering, Willie Hammer, Dennis Price, Prentice Hall, 2001
- [6] Laboratory Safety: Principles and Practices-Diane O. Fleming & Debra L. Hunt. ASM Press

