Course Specification
(Bachelor)

Course Title:	Laboratory Safety and Management
Course Code:	CHM 1152
Program:	Bachelor of Science in Chemistry
Department:	Chemistry
College:	Science
Institution:	Imam Mohammed Ibn Saud Islamic University
Version:	2024 V1
Last Revision Date:	13 October 2024

Table of Contents

A. General information about the course:

-1. Course Identification

1. Credit hours: 1 (0, 0, 3)					
1 (0, 0, 3 lab)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: Level 2/ 2nd year					
4. Course general Description:					
The course covers an understanding of laboratory principles safety and management. The students will be able to more readily identify laboratory hazards and implement effective control measures and become aware of good design, management and laboratory practices. The course will introduce understand the process of assessing and reducing the risks within laboratories					
5. Pre-requirements for this course (if any):					
General Chemistry (1)/ CHM 1101					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					

The objective of this course

- **To establish the foundation for a comprehensive laboratory safety management plan (LSM)**
- **To recognize procedure & guidelines have been established to safely control those hazards associated with the operation of teaching and research labs.**
- **To ensure the achievement of safety regulations.**
- **To manage the available resources and adequate for the possible job.**

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning	0	0
3	Hybrid • Traditional classroom • E-learning	0	0
4	Distance learning	0	0

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**0**
2.	**Laboratory/Studio**	**45**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify)**	**0**
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**To define the principles of safety**	**K1; K2;**	Lecturing	Short quizzes
1.2	**To list of emergency responses and the routes of exposures to hazards**	**K1; K2;**	Homework and assignment	Homework and assignment marks and written exams
1.3	**To state the minimization, controlling and managing hazards**	**K1; K2**	Discussions, Laboratory classes	Quizzes and MCQs, laboratory report
1.4	**To recognize the toxicity of chemical compounds through simple mechanism based chemical reactivity of functional groups.**	**K1; K2**	Discussions, Laboratory classes	Quizzes and MCQs, laboratory report
2.0	**Skills**			
2.1	**To prepare the safety reports periodically and compare between hazards and non-hazards treatment.**	**S1; S2; S4**	Lecturing and oral discussion	Short quizzes and Multiples Choice Questions
2.2	**To demonstrate skills to participate in class by asking questions and giving answers.**	**S1; S2; S3**	Lectures supported by laboratory experiments	Homework assignment, Examination and laboratory sheet
2.3	**To show effectively the collaboration and inter-professionalism in class**	**S2**	Lecturing and oral discussion supported by laboratory experiments	Examination and laboratory report

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	discussions or team works, as well as independently.			
2.4	**To use mail and Network in communicating with the others effectively.**	**S1; S2; S3**	• Seminars • lab experiment • Encourage students to use electronic mailand blackboard to submit works and assessments.	• Presentation marks • Oral tests and lab sheets • Assignments and homework • Laboratory performance • Laboratory reports and sheet
3.0	**Values, autonomy, and responsibility**			
3.1	**To demonstrate responsibility for their own learning and motivate for Team Work.**	**V1; V2**	• Group discussion, assignments and homework • Lab-reports Virtual labs and demonstrations	• Oral tests, lab performance, Lab-reports and sheets Marks • Assignments and homework marks

C. Course Content

No	List of Topics	Contact Hours
1.	PRINCIPLES, ETHICS, AND PRACTICES: THE FOUR PRINCIPLES OF SAFETY, WHAT IS GREEN CHEMISTRY? RETHINKING SAFETY: LEARNING FROM LAB INCIDENTS, GREEN CHEMISTRY IN THE ORGANIC CURRICULUM, FOSTERING A SAFETY CULTURE, EMPLOYERS' EXPECTATIONS OF SAFETY SKILLS FOR NEW CHEMISTS LAWS AND REGULATIONS PERTAINING TO SAFETY GREEN CHEMISTRY—THE BIG PICTURE	6
2.	EMERGENCY RESPONSE : RESPONDING TO LABORATORY EMERGENCIES, FIRE EMERGENCIES IN INTRODUCTORY COURSES, CHEMICAL SPILLS: ON YOU AND IN THE LABORATORY, FIRST AID IN CHEMISTRY LABORATORIES, FIRE EMERGENCIES IN ORGANIC AND ADVANCED COURSES, CHEMICAL SPILLS: CONTAINMENT AND CLEANUP	6
3	UNDERSTANDING AND COMMUNICATING ABOUT LABORATORY HAZARDS: ROUTES OF EXPOSURES TO HAZARDS, LEARNING THE LANGUAGE OF	

	SAFETY: SIGNS, SYMBOLS, AND LABELS, FINDING HAZARD INFORMATION: MATERIAL SAFETY DATA SHEETS (MSDSS), THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING, OF CHEMICALS (GHS) INFORMATION RESOURCES ABOUT LABORATORY HAZARDS AND SAFETY, INTERPRETING MSDS INFORMATION, CHEMICAL HYGIENE PLANS	6
4	RECOGNIZING LABORATORY HAZARDS: TOXIC SUBSTANCES AND BIOLOGICAL AGENTS: INTRODUCTION TO TOXICOLOGY, ACUTE TOXICITY, CHRONIC TOXICITY CARCINOGENS, BIOTRANS-FORMATION , BIOACCUMULATION, AND ELIMINATION OF TOXICANTS, BIOLOGICAL HAZARDS AND BIOSAFETY	6
5	RECOGNIZING LABORATORY HAZARDS: PHYSICAL HAZARDS: CORROSIVE HAZARDS IN INTRODUCTORY CHEMISTRY LABORATORIES FLAMMABLES—CHEMICALS WITH BURNING PASSION,CORROSIVES IN ADVANCED LABORATORIES, THE CHEMISTRY OF FIRE AND EXPLOSIONS INCOMPATIBLES—A CLASH OF VIOLENT PROPORTIONS, GAS CYLINDERS AND CRYOGENIC LIQUID TANKS, PEROXIDES, POTENTIALLY EXPLOSIVE HAZARDS, REACTIVE AND UNSTABLE LABORATORY CHEMICALS, HAZARDS FROM LOW- OR HIGH-PRESSURE SYSTEMS ELECTRICAL HAZARDS,HOUSEKEEPING IN THE RESEARC, LABORATORY—THE DANGERS OF MESSY LABS, NONIONIZING RADIATION AND ELECTRIC AND MAGNETIC FIELDS, AN ARRAY OF RAYS—IONIZING RADIATION HAZARDS IN THE LABORATORY, CRYOGENIC HAZARDS—A CHILLING EXPERIENCE, RUNAWAY REACTIONS, HAZARDS OF CATALYSTS	6
6	MINIMIZING, CONTROLLING, AND MANAGING HAZARDS : MANAGING RISK—MAKING DECISIONS ABOUT SAFETY, LABORATORY EYE PROTECTION, PROTECTING YOUR SKIN—CLOTHES, GLOVES, AND TOOLS, CHEMICAL HOODS IN INTRODUCTORY LABORATORIES, MORE ABOUT EYE AND FACE PROTECTION, PROTECTING YOUR SKIN IN ADVANCED LABORATORIES, CONTAINMENT AND VENTILATION IN ADVANCED LABORATORIES, SAFETY MEASURES FOR COMMON LABORATORY OPERATIONS, RADIATION SAFETY, LASER SAFETY, BIOLOGICAL SAFETY CABINETS, PROTECTIVE CLOTHING AND RESPIRATORS SAFETY IN THE RESEARCH LABORATORY, PROCESS SAFETY FOR CHEMICAL OPERATIONS	9
7	CHEMICAL MANAGEMENT: INSPECTIONS, STORAGE, WASTES, AND SECURITY, INTRODUCTION TO HANDLING CHEMICAL WASTES, STORING FLAMMABLE AND CORROSIVE LIQUIDS DOING YOUR OWN LABORATORY SAFETY INSPECTION, MANAGING CHEMICALS IN YOUR LABORATORY, CHEMICAL, INVENTORIES AND STORAGE, HANDLING HAZARDOUS LABORATORY WASTE, CHEMICAL SECURITY	6

	Total	45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, Attendance, Participation, Lab. Reports	All the semester	20 %
2.	Midterm Exam	Around 6th week	20 %
4.	Midterm Exam	Around 12 th week	20 %
5.	Final Exam	Around 16-17th week	40 %
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	LABORATORY SAFETYFOR CHEMISTRY STUDENTS, Hill, R. Jr., Finster, D. C., 2ED, Wiley, 2012, ISBN-10: 0470344288
Supportive References	
Electronic Materials	Blackboard
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Each of the class room should be equipped with a whiteboard and a projector, with a maximum of 20 students. • In each laboratory, a list of safety and precautions are provided. • In each lab has proper ventilation, and well equipped with instruments. • In each lab, containers for solid waste, liquid waste, and crushed glasses. • Each lab has a small pharmacy for first aid in case of an accident

Items	Resources
	• In each lab, the rules, conditions, and safety mechanism as well list of Risk, Safety precautions according to Merck Catalogue are hanging in the labs
Technology equipment (projector, smart board, software)	• The rooms are equipped with data show, Smart Board, WI-FI access.
Other equipment (depending on the nature of the specialty)	• Appropriate Glasswares for carrying the requested experiments (conical flasks, beakers, measuring cylinders) • Appropriate fine chemicals and solvents (distilled Water ammonium nitrate) • Analytical balance (3 digits), Set gas laws with the glass jacket Data acquisition set for gas laws with glass jacket, PC, Windows® 95 or higher, calorimeter, thermometer, Filter papers , clamps, stands

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students**	**Direct:** Questionnaire.
	Course Responsible	**Direct:** Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.
	Peer Reviewer	**Direct:** Questionnaire. **Indirect:** External assessor report.
Effectiveness of Students assessment	**Program Leaders**	**Direct:** Course e-Portfolio. **Indirect:** Course report.
Quality of learning resources	**Students**	**Indirect:** Second examiner checklist-Course report.
	Faculty (Academic Advisory)	**Direct:** course Entrance/Exit. **Indirect:** Observations - Accreditation review.
	Program Leaders	**Direct:** Course e-Portfolio. **Indirect:** Course evaluation survey- Observations- Syllabus review- Accreditation review.
The extent to which CLOs have been achieved	**Course Responsible**	**Direct:** Exams - Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.

Assessment Areas/Issues	Assessor	Assessment Methods
	Program Leaders	**Indirect:** Exams.

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**COUNCIL OF DEPARTMENT OF CHEMISTRY**
REFERENCE NO.	**7 (NO. 2/3)**
DATE	**29/3/1446 - 2/10/2024**