Course Specification
(Bachelor)

Course Title:	**Safety and Quality Assurance in Chemical laboratories**
Course Code:	**CHM 1150**
Program:	**Bachelor of Science in Chemical Laboratories**
Department:	**Chemistry**
College:	**Science**
Institution:	**Imam Mohammed Ibn Saud Islamic University**
Version:	**2024- -1**
Last Revision Date:	**15 September 2024**

Table of Contents

A. General information about the course:

-1. Course Identification

1. Credit hours: 2 (2, 0, 0)					
2 (2 Lectures, 0 Lab, 0 Tutorials)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: Level 2/ Second year					
4. Course general Description:					
This course aims to equip students with fundamental knowledge of quality management and its application to the laboratory testing and certification practices. Students will learn about several contemporary laboratory quality and management approaches. These include establishing traceability, accuracy, and reliability in measurement; estimating measurement uncertainty; quality control and assurance in testing and certification; laboratory and data auditing; and accreditation and international standards in quality management for testing and certification (e.g., ISO9001, ISO/IEC17025, ILAC, HKOLAS)					
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):					

At the end of the course, the students will be able to:

- ✓ **Recognize quality management ideas, the benefits of implementing them, and the documentation requirements for laboratories under ISO 17025.**
- ✓ **Understand the purpose and typical content of quality manuals, system procedures, work instructions, and test methods.**
- ✓ **Be familiar with documentation control and application in laboratory control**
- ✓ **Be aware of ISO 17025's standards for laboratory management.**
- ✓ **Define a laboratory's interactions with external.**

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**30**	**100%**
2	E-learning	**0**	**0**
3	Hybrid • Traditional classroom • E-learning	**0**	**0**

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning	0	0

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	**0**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify)**	**0**
Total		30

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 Outline worldwide quality and safety standards for laboratory testing and certification, such as ISO9001 and ISO/IEC17025**	**K1; K2; K3;**	• **Lectures** • **Group disscussion**	**Direct;** **Short quizzes**
1.2	**To Define managerial and auditing ideas from international quality systems to the testing and certification sector.**	**K1; K2; K3**	• **Lectures** • **Group disscussion**	**Direct;** **Exams**
1.3	**To state accurate calibration methods and estimate measurement uncertainty for various laboratory testing scenarios.**	**K1; K3**	• **Lecture, and homework**	**Direct;** **Homework assignment marks**
2.0	**Skills**			
2.1	**To demonstrate qualified skills in setting up apparatus**	**S1; S2; S3**	• Lectures • Oral discussions	**Direct**

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	and instruments in well modern equipped laboratories			• Solved problem marks • Short quizzes and homework assignment
2.2	**To Evaluate the ability/skill required to analyze and justify the obtained results using advanced digital techniques associated with lab instruments.**	**S1; S2; S3**	Tutorial, Brain storming and self-study	**Direct** • Work portfolio • homework
2.3	**To demonstrate skills to participate in class by asking questions and giving answers.**	**S3**	Motivate students to ask questions and to give response.	**Direct** Participation marks
3.0	**Values, autonomy, and responsibility**			
3.1	**To appraise teamwork, and create awareness to maintain scientific integrity during different assessments, projects, and mini reports.**	**V1, V2**	• Group discussion and assignments • homework	**Direct** • Oral tests Assignments • homework marks

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction to Quality Assurance:** Terminologies and Definitions. Quality, Concepts of Quality Management, Management System, Accreditation, Certification, Quality Assurance, Quality Control, Auditing, Reviewing, Standards and Measurands, Certified Reference Materials, Procedure, Traceability, Uncertainty, Method Validation, Laboratory Quality Systems. (ISO9001 & ISO/IEC 17025)	2
2.	**Safety and Environmental Management in the Laboratory**: Accommodation and Laboratory Environment, Temperature; Humidity; Vibration; Airborne and dust borne microbiological contamination; Lighting.	4
3.	**Management in the laboratory:**	4

	Document Management: Documentation, Standard operation procedure (SOP). Documentation of Laboratory Systems, Preparation, and control of Laboratory Documents,	
4.	**Technical Management:** Sample Management, Test and Calibration Methods, Equipment Management, Types of Equipment in the laboratory, Reagents and Consumables,	4
5.	**Method Validation:** Characterization of Validation Parameters, Selectivity, Linearity and Calibration, Limit of Detection and Limit of Quantitation, Calculating LOD Based on the Standard Deviation of Signals, Range , Sensitivity , Precision, Accuracy.	4
6.	**Sampling:** Subsample, Laboratory sample, Test sample, sample handling and preparation,	4
7.	**Personnel Management:** **Staff Policies,** Defined responsibilities & authority, Defined lines of communication, Job descriptions, Defined competencies, Assessing competence, Training & evaluation, Records, Staff morale	2
8.	**Quality assurance and Quality Control in testing:** Definitions, Quality Assurance System, Basic Statistics, Measurement Uncertainty.	2
9.	**Good Laboratory Practice (GLP):** Cleaning labware, transferring and diluting solutions, controlling lab hazards, spill control and emergency planning, chemical waste disposal.	2
10.	**Internal auditor and assessor requirements**	2
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, Attendance, Participation, Homework	All the semester	20%
2.	Midterm Exam 1	Around 6th -7th week	20%
3.	Midterm Exam 2	Around 11th -12th week	20%
4.	Final Exam	Around 15th – 16th 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	Piotr Konieczka, Jacek Namiesnik, **Quality Assurance and Quality Control in the Analytical Chemical Laboratory: A Practical Approach,** CRC Press; 1st edition (February 23, 2009), ISBN-10 : 1420082701**,** ISBN-13 : 978-1420082708
Supportive References	Jack P. Pekar**, Total Quality Management: Guiding Pricibles for Application, 1995,**ASTM Manual Series: MNL 22 ASTM Publication Code Number (PCN) 28-022095-34, ISBN-10 : 0803120621**,** ISBN-13 : 978-0803120624
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• **Each classroom is equipped with PC and retro projector with a maximum of 25 students**
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)	**None**

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.

Assessment Areas/Issues	Assessor	Assessment Methods
	Program Leaders	**Indirect:** Observations - Accreditation review. **Direct:** Course e-Portfolio. **Indirect:** Course evaluation survey- Observations- Syllabus review- Accreditation review.
The extent to which CLOs have been achieved	**Course Responsible** **Program Leaders**	**Direct:** Exams - Course e-Portfolio. **Indirect:** Second examiner checklist-Course report. **Indirect:** Exams.
Other		

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.	**3 (NO. 1/3)**
DATE	**5/3/1446- 8/09/2024**