



## Lahore University of Management Sciences

### CHEM 410: Physical Chemistry Lab

Fall 2023

Instructor	Habib ur Rehman
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Teaching Assistants (TAs)	TBA
TA Office Hours	On LMS
Course URL (if any)	LMS

#### Course Teaching Methodology

- Teaching Methodology: In-class lectures and In-lab experiments
- Lecture details: A 50 min in-class lecture before the lab experiment

#### COURSE BASICS

Credit Hours	2			
Lecture (per week)	Nbr of Lec(s) Per Week	-	Duration	-
Recitation (per week)	Nbr of Rec(s) Per Week	-	Duration	-
Lab (per week)	Nbr of Session(s) Per Week	1	Duration	6 hours
Tutorial (per week)	Nbr of Tut(s) Per Week	-	Duration	-

#### COURSE DISTRIBUTION

Core	Chemistry majors
Elective	SSE students – consent is required from the instructor
Open for Student Category	
Closed for Student Category	

#### COURSE DESCRIPTION

This lab is designed to give students exposure to general and specialized lab instruments and experimental techniques used in physical chemistry. Each experiment is designed to utilize different techniques to explore and understand the underlying concepts in key areas of physical chemistry including classical and statistical thermodynamics, quantum chemistry, chemical kinetics, surface chemistry, and polymer/material characterization.

#### COURSE PREREQUISITE(S)

	None
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#### COURSE OBJECTIVES

<ul style="list-style-type: none"><li>• Enhance the analytical skills in problem-solving capabilities</li><li>• Understand, utilize and test concepts learned in the earlier courses</li><li>• Get conversant with general and modern laboratory instrumentation</li><li>• Obtain, analyze and report data</li></ul>	
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#### LEARNING OUTCOMES

<ul style="list-style-type: none"><li>• Practically learn the key concepts of physical chemistry</li><li>• Obtain, analyze and report data in a scientific way</li><li>• Understand the principles behind instrumentation and laboratory techniques</li><li>• Able to practice safe laboratory practices when handling chemicals, instruments and lab space</li></ul>	
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## Lahore University of Management Sciences

GRADING POLICY	
Lab Performance	15 %
Lab Reports	40 %
Pre-lab Quizzes	20 % (Total 10 quizzes)
Final Quiz/Viva	25 %

EXAMINATION DETAIL	
Midterm Exam	No
Final Exam	No

Harassment Policy
<p>Harassment of any kind is unacceptable, whether it be sexual harassment, online harassment, bullying, coercion, stalking, verbal or physical abuse of any kind. Harassment is a very broad term; it includes both direct and indirect behaviour, it may be physical or psychological in nature, it may be perpetrated online or offline, on campus and off campus. It may be one offense, or it may comprise of several incidents which together amount to sexual harassment. It may include overt requests for sexual favors but can also constitute verbal or written communication of a loaded nature. Further details of what may constitute harassment may be found in the LUMS Sexual Harassment Policy, which is available as part of the university code of conduct.</p> <p>LUMS has a Sexual Harassment Policy and a Sexual Harassment Inquiry Committee (SHIC). Any member of the LUMS community can file a formal or informal complaint with the SHIC. If you are unsure about the process of filing a complaint, wish to discuss your options or have any questions, concerns, or complaints, please write to the Office of Accessibility and Inclusion (OAI, <a href="mailto:oai@lums.edu.pk">oai@lums.edu.pk</a>) and SHIC (<a href="mailto:shic@lums.edu.pk">shic@lums.edu.pk</a>) — both of them exist to help and support you and they will do their best to assist you in whatever way they can.</p> <p><b>To file a complaint, please write to <a href="mailto:harassment@lums.edu.pk">harassment@lums.edu.pk</a>.</b></p>
SSE Council of Equity and Belonging
<p>In addition to LUMS resources, SSE's <b>Council on Belonging and Equity</b> is committed to devising ways to provide a safe, inclusive and respectful learning environment for students, faculty and staff. To seek counsel related to any issues, please feel free to approach either a member of the council or email at <a href="mailto:cbe.sse@lums.edu.pk">cbe.sse@lums.edu.pk</a></p>

COURSE OVERVIEW		
Exp. No.	Experiment Title	Readings
1	Characterization of nanoparticles using Powder X-ray Diffraction and Scanning Electron Microscopy	Lab Manual
2	Determination of adsorption isotherms for the adsorption of acetic acid on activated charcoal	Lab Manual
3	Determination of enthalpy of combustion using bomb calorimeter	Lab Manual
4	Visible spectra of conjugated dyes – (Particle-in-a-box model)	Lab Manual
5	Thermodynamics of Micellization of Sodium Dodecyl Sulphate (SDS)	Lab Manual
6	Determination of Bandgaps using UV-vis Spectrophotometer and Use of Photocatalysts for Photodegradation of Organic Dyes under UV Irradiation	Lab Manual
7	Phase diagram for a three-component system	Lab Manual
8	Measurement of thermal transitions (glass transition temperature, crystallization temperature, and melting temperature) of polymer samples by differential scanning calorimetry (DSC)	Lab Manual
9	Study of reaction kinetics: Hydrolysis of ethyl acetate	Lab Manual
10	Electrochemical investigation of Potassium Ferricyanide as a model redox system: A Cyclic Voltammetry (CV) study	Lab Manual
11	Introduction to Photolithography	Lab Manual
12	Determination of partial molar quantities	Lab Manual
13	Colligative properties: Freezing point depression	Lab Manual

Textbook(s)/Supplementary Readings
<ol style="list-style-type: none"><li>1. Experiments in Physical Chemistry” by Carl W. Garland, Joseph W. Nibler, and David P. Shoemaker (McGraw-Hill)</li><li>2. Experimental Physical Chemistry : A Laboratory Textbook by George McBane and Arthur Halpern (2006)</li></ol>