Ahmedabad University

Course	CHE101 PHYSICAL CHEMISTRY	Semester	Monsoon Semester 2024
Faculty Name(s)	Aditi Singhal	Contact	aditi.singhal@ahduni.edu.in
School	SEAS	Credits	1.5
GER Category:	Not Applicable	Teaching Pedagogy Enable:NO	P/NP Course: Can not be taken as P/NP
Schedule	Section 1 — 01:00 pm to 02:30 pm — Fri — 29-07-24 to 26-11-24 Section 1 — 01:00 pm to 02:30 pm — Wed — 29-07-24 to 20-09-24		
Prerequisite	Not Applicable		
Antirequisite	Not Applicable		
Corequisite	Not Applicable		
Course Description	This course covers the fundamentals of physical chemistry and has been designed to cater the needs of chemical and mechanical engineering students. This course includes chemical kinetics, electrochemistry, equilibrium and Batteries etc. This course makes the basis for some of the specialized topics of chemical engineering curriculum		

Course Objectives	The objectives of the course are to CEO 1 Become aware of physical chemistry aspects in a variety of applications across disciplines; CEO 2 To get students acquainted with the basics of physical chemistry; CEO 3 To improve the fundamentals of the subject; CEO 4 To improve the problem solving skill of the students; CEO 5 To help students develop creative thinking and CEO 6 To experiment with some new ideas from everyday life applications to practice applications of the skills gained.
Learning Outcomes	After completing this course, a student should be able to, • CO1 Identify chemistry aspects in engineering applications; • CO2 Understand the basic foundation of physical chemistry which is broadly applicable to other areas of chemistry; • CO3 Solve problems competently by applying right approach to arrive at a solution; • CO4 Familiarize themselves with the current topics useful towards the energy related issues and • CO5 Correlate the importance of fundamental elements of physical chemistry in nature and life
Pedagogy	Class lectures and Discussion
Expectation From Students	Students are expected to attend the sessions regularly and complete the assignments on time.

Assessment/Evaluation	• Mid-Semester Examination:
	  ◦ Written - 30%
	• End Semester Examination:
	  ◦ Written - 30%
	• Other Components:
	  ◦ Quiz - 20%
	  ◦ Assignment - 20%

Attendance Policy	As per Ahmedabad University Policy.

Project / Assignment Details	NA
Course Material	Text Book(s) • Principles of Physical Chemistry 46th,, Puri, Sharma and Phatania,, 46 Edition, Vishal Publishing Company press, Year: 2013, Reference Book • Elements of Physical Chemistry, Peter Atkins, Julio De Paula,, 9 Edition, Oxford University,, Year: 2011, • Physical Chemistry, Robert J. Silbey, Robert A. Alberty, Moungi G. Bawendi,, 4 Edition, Wiley India Pvt. Ltd, Year: 2006, • Physical Chemistry, G. W. Castellan, 3 Edition, Narosa Book Distributors,, Year: 2004,
Additional Information	

Session Plan

NO.	TOPIC TITLE	TOPIC & SUBTOPIC DETAILS	READINGS,CASES,ETC.	ACTIVITIES	IMPORTANT DATES
1	Introduction, Electrochemistry	Galvanic cell, Hydrogen electrode, Calomel electrode, Single electrode potential, Electrical energy and free energy change in the reaction	Puri, Sharma and Phatania, Principles of Physical Chemistry 46th, Vishal Publishing Company press, 2013, Chapter 23	Lecture and discussion	
2	Electrochemistry	Nernst equation, Standard electrode potential, Electrolytic conductance - Electrochemical series, resistance, Conductance,	Text book, Chapter-23	Lecture and discussion	
3	Electrolytic conductance	Electrochemical series, resistance, Conductance, Specific resistance and specific conductance, Equivalent and molar conductance, Cell constant. electrodeposition	Text book,Chapter-24	Lecture and discussion, Numerical Practice	
4	Chemical Kinetics	Order and Molecularity, First and second	Text book, Chapter-28	Lecture and discussion, Numerical Practice	
5	Chemical Kinetics	Third order, zero order,	Text book, Chapter-28	Lecture and discussion	
6	Chemical Kinetics	Arrhenius equation, Problem solving	Text book,Chapter-28	Lecture and discussion	
7	Chemical Equilibrium	Law of mass action, Homogeneous equilibrium	Text book, Chapter-17	Lecture and discussion, Numerical Practice	
8	Chemical Equilibrium	Homogeneous equilibrium	Text book, Chapter-17	Lecture and discussion, Numerical Practice	
9	Heterogeneous equilibrium	Van't Hoff equation, Le Chatelier principle, Effect of various parameters on chemical equilibrium	Text book, Chapter-17	Lecture and discussion	

10	Heterogeneous equilibrium	Van't Hoff equation, Le Chatelier principle,	Text book, Chapter-17	Numerical Practice	
11	Heterogeneous equilibrium	Le Chatelier principle and its effect of various parameters on chemical equilibrium	Text book, Chapter-17	Numerical Practice	
12	Ionic Equilibrium	Acids and bases, Arrhenius concept, Lowry bronsted proton concept, Lewis concept,	Text book, Chapter-20	Lecture and discussion	
13	Ionic Equilibrium	Dissociation of weak acid and weak base, Dissociation of water, pH,	Text book, Chapter-20	Lecture and discussion, Numerical Practice	
14	Ionic Equilibrium	Buffer solutions,	Text book, Chapter-20	Lecture and discussion	
15	Ionic Equilibrium	Salt hydrolysis	Text book, Chapter-20	Lecture and discussion	
16	Battery Fundamentals	Lithium ion battery,	Course material provided by Instructor	Lecture and discussion	
17	Battery Fundamentals	Lead acid battery,	Course material provided by Instructor	Lecture and discussion	
18	Battery Fundamentals	Battery management, usage and disposal	Course material provided by Instructor	Lecture and discussion	
19	Solid State Chemistry	Symmetry and Crystal Structure,	Text Book, Chapter 31	Lecture and discussion	
20	Solid State Chemistry	X-ray diffraction,	Text Book, Chapter 31	Lecture and discussion	
21	Solid State Chemistry	Defects chemistry	Text Book, Chapter 31	Lecture and discussion, Numerical Practice	
22	Revision and reflection				