

CHEM 2010 PHYSICAL CHEMISTRY

Credit Points 10

Legacy Code 300849

Coordinator Gang Zheng ([https://directory.westernsydney.edu.au/search/name/Gang Zheng/](https://directory.westernsydney.edu.au/search/name/Gang%20Zheng/))

Description Physical Chemistry describes the fundamentals of energy changes in chemical systems (thermodynamics), the rates and mechanisms of chemical reactions (kinetics), and electrochemistry and/or ion and electron transport. These concepts will be applied to a range of chemical and/or biochemical processes. A major focus of the subject will be to develop the ability to study quantitative chemical/biochemical problems, and develop useful physical chemistry experimental and data-analysis skills.

School Science

Discipline Chemical Sciences, Not Elsewhere Classified.

Student Contribution Band HECS Band 2 10cp

Check your HECS Band contribution amount via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 2 subject

Pre-requisite(s) CHEM 1008 Introductory Chemistry

Restrictions

Successful completion of 60 credit points

Assumed Knowledge

This subject requires a knowledge of introductory concepts in differential and integral calculus.

Learning Outcomes

On successful completion of this subject, students should be able to:

- Apply the First Law of thermodynamics to a system and its surroundings.
 - Explain the Second Law of thermodynamics and relate it to the physical meaning of entropy of a system.
 - Gather data, synthesise and calculate changes in state functions such as enthalpy, entropy, and Gibbs free energy.
 - Relate thermodynamic quantities to the potential of an electrochemical cell.
 - Determine rate laws from kinetic data and relate these to mechanisms and the determination of theoretical rate equations.
 - Conduct basic chemistry experiments, individually or as a member of a team, showing familiarity with scientific instrumentation, identifying accuracy and reliability, and carrying out risk assessments.
 - Analyse and communicate experimental data correctly in a Lab Report and/or record of the results of investigations, using the conventions of scientific writing.
- The difference between thermodynamically reversible and irreversible processes
 - Heat capacities, and the relationships between heat and enthalpy change
 - The Second Law of Thermodynamics, its applications, and the calculation of entropy of the system, and surroundings
 - Calculation of Gibbs free energy and their effect on (1) the direction of chemical change; (2) the equilibrium constant of a chemical reaction; and (3) the reversible potential of an electrochemical cell and/or ion transport across a biological membrane
 - Calculation of equilibrium constants using thermodynamic quantities, with applications to a range of chemical/biological processes, and how chemical equilibria are affected by changed reaction conditions and/or inter- and intramolecular interactions
 - Use of van't Hoff plots for calculating enthalpy and entropy changes
 - The relationship between thermodynamic quantities and the equilibrium potential of an electrochemical cell, and/or ion and electron transport in biological systems (for example, ion channels and ion pumps)
 - Thermodynamic nonideality and its modelling using activities and activity coefficients
 - Rate equations, reaction orders and rate constants and determination of simple rate laws from experimental kinetic data using integrated rate equations and initial rate methods
 - The relationships between reaction mechanisms and rate equations, and the effects of temperature on reaction rates
 - Use of the steady-state and pre-equilibrium approximations in a range of kinetic calculations; and/or enzyme catalysis and inhibition as illustrated by Michaelis-Menten model
 - Laboratory skills and techniques in

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/Group Task
Numerical Problem Solving	Up to 1000 words	30	N	Individual
Practical	Lab report about 200 words each (x5)	30	Y	Individual
Final Exam	2 hours	40	Y	Individual

Teaching Periods

Spring (2022)

Parramatta - Victoria Rd

Day

Subject Contact Abhishek Gupta ([https://directory.westernsydney.edu.au/search/name/Abhishek Gupta/](https://directory.westernsydney.edu.au/search/name/Abhishek%20Gupta/))

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=CHEM2010_22-SPR_PS_D#subjects)

Subject Content

- The First Law of Thermodynamics and transfer of energy as work and/or heat due to some simple physical and biological processes

Spring (2023)

Parramatta - Victoria Rd

On-site

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View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=CHEM2010_23-SPR_PS_1#subjects)