



FIRST-YEAR OF MASTER OF SCIENCE CHEMISTRY REVISED SYLLABUS ACCORDING TO CBCS NEP2020

COURSE TITLE: PHYSICAL CHEMISTRY-II
SEMESTER-II
W.E.F. 2023-2024

**RECOMMENDED BY THE BOARD OF STUDIES IN CHEMISTRY
AND
APPROVED BY THE ACADEMIC COUNCIL**

Devrukh Shikshan Prasarak Mandal's
Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and
Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh.
Tal. Sangameshwar, Dist. Ratnagiri-415804, Maharashtra,
India

Academic Council Item No: 03 dated 08 July 2023

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangameshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Master of Science
Name of the Department	:	Chemistry
Name of the Class	:	First Year
Semester	:	Second
No. of Credits	:	02
Title of the Course	:	Physical Chemistry-II
Course Code	:	S515CHT
Name of the Vertical in adherence to NEP 2020	:	Elective
Eligibility for Admission	:	Chemistry Graduate learner seeking Admission to Post Graduate Programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra
Passing Marks	:	40%
Mode of Assessment	:	Formative and Summative
Level	:	PG
Pattern of Marks Distribution for SEE and CIA	:	60:40
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2023-2024
Ordinances /Regulations (if any)		

Syllabus for First Year of Master of Science in Chemistry

(With effect from the academic year 2023-2024)

SEMESTER-II

Course Title: Physical Chemistry-II

No. of Credits - 02

Type of Vertical: Elective

COURSE CODE: S515CHT

Learning Outcomes Based on BLOOM's Taxonomy:

After completing the course, the learner will be able to...		
Course Learning Outcome No.	Blooms Taxonomy	Course Learning Outcome
CLO-01	Remember	describe phase rule to two component, three component systems and various types of defects.
CLO-02	Understand	explain Application of the Schrödinger equation to two electron system.
CLO-03	Apply	determine fugacity of real gases, Kinetics of reactions in the Solid State and apply Hückel Molecular Orbitals theory to various molecules.
CLO-04	Analyse	differentiate between Competitive, Noncompetitive and Uncompetitive Inhibition and deduce equations related to thermodynamics of surfaces.

Syllabus for First Year of Master of Science in Chemistry

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SEMESTER-II

Course Title: Physical Chemistry-II

No. of Credits - 02

Type of Vertical: Elective

COURSE CODE: S515CHT

COURSE CONTENT			
Module No.	Content	Credits	No. of Hours
1	<p>Chemical Kinetics and Molecular Reaction Dynamics</p> <ul style="list-style-type: none"> ○ Elementary Reactions in Solution:- Solvent Effects on reaction rates, Reactions between ions- influence of solvent Dielectric constant, influence of ionic strength, Linear free energy relationships Enzyme action ○ Kinetics of reactions catalyzed by enzymes Michaelis-Menten analysis, Lineweaver-Burk and Eadie Analyses. ○ Inhibition of Enzyme action: Competitive, Noncompetitive and Uncompetitive Inhibition. Effect of pH, Enzyme activation by metal ions, Regulatory enzymes. ○ Kinetics of reactions in the Solid State:- Factors affecting reactions in solids Rate laws for reactions in solid: The parabolic rate law, The first order rate Law, the contracting sphere rate law, Contracting area rate law, some examples of kinetic studies. 	01	15
2	<p>Solid State Chemistry and Phase Equilibria</p> <p>Solid State Chemistry</p> <ul style="list-style-type: none"> ○ Recapitulation: Structures and Defects in solids. ○ Types of Defects and Stoichiometry <ol style="list-style-type: none"> a) Zero dimensional (point) Defects b) One dimensional (line) Defects c) Two dimensional (Planar) Defects d) Thermodynamics of formation of defects (Mathematical derivation to find concentration of defects and numerical problems based on it) 	01	15

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	<p>Phase equilibria</p> <ul style="list-style-type: none"> ○ Recapitulation: Introduction and definition of terms involved in phase rule. ○ Thermodynamic derivation of Gibbs Phase rule. ○ Two component system: <ul style="list-style-type: none"> a) Solid –Gas System : Hydrate formation, Amino compound formation b) Solid – Liquid System: Formation of a compound with congruent melting point, Formation of a compound with incongruent melting point. (with suitable examples) ○ Three component system <ul style="list-style-type: none"> Type-I: Formation of one pair of partially miscible liquids Type-II: Formation of two pairs of partially miscible liquids Type-III: Formation of three pairs of partially miscible liquids 		
	Total	2	30

Access to the Course

The course is available for all the students admitted for Master of Science.

Methods of Assessment

The assessment pattern would be 60:40, 60% for Semester End Examination (SEE) and 40% for Continuous Internal Assessment (CIA). The structure of the SEE and CIA would be as recommended by the Board of Studies and approved by the Board of Examination and the Academic Council of the college.

References:

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2. K. J. Laidler and J. H. Meiser, Physical Chemistry, 2nd Ed., CBS Publishers and Distributors, New Delhi, 1999.
3. Robert J. Silby and Robert A. Alberty, Physical Chemistry, 3rd Edn., John Wiley and Sons (Asia) Pte. Ltd., 2002.
4. Ira R. Levine, Physical Chemistry, 5th Edn., Tata McGraw-Hill New Delhi, 2002.
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7. Principles of Chemical Kinetics, 2nd Ed., James E. House, ELSEVIER, 2007.
8. B.K. Sen, Quantum Chemistry including Spectroscopy, Kalyani Publishers, 2003.
9. A.K. Chandra, Introductory Quantum Chemistry, Tata McGraw – Hill, 1994.
10. R.K. Prasad, Quantum Chemistry, 2nd Edn., New Age International Publishers, 2000.
11. S. Glasstone, Thermodynamics for Chemists, Affiliated East-West Press, New Delhi, 1964.
12. W. G. Davis, Introduction to Chemical Thermodynamics – A Non – Calculus Approach, Saunders, Philadelphia, 19772.
13. Peter A. Rock, Chemical Thermodynamics, University Science Books, Oxford University Press, 1983.
14. Ira N. Levine, Quantum Chemistry, 5th Edn., Pearson Education (Singapore) Pte. Ltd., Indian Branch, New Delhi, 2000.
15. Thomas Engel and Philip Reid, Physical Chemistry, 3rd Edn., Pearson Education Limited 2013.
16. D.N. Bajpai, Advanced Physical Chemistry, S. Chand 1st Edn., 1992.
17. Solid State Chemistry [An Introduction], 3rd Ed., Lesley E. Smart & Elaine A. Moore, Taylor & Francis, 2010.
18. The Physics and ‘Chemistry of Solids, Stephen Elliott, Willey India, 2010
19. Principles of the Solid State, H.V. Keer, New Age International Publishers, 2011.
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21. Principles of physical Chemistry, Marrown and Prutton 5th edition
22. Essentials of Physical Chemistry, Arun Bahl, B. S Bahl, G. D.Tulli , S Chand and Co. Ltd , 2012 Edition.
23. Introduction of Solids L.V Azaroff , Tata McGraw Hill .
24. A Text book of physical Chemistry; Applications of thermodynamics vol III, Mac Millan Publishers India Ltd ,2011
25. New directions in solid state Chemistry, C.N.R. Rao and J. Gopalkrishnan, Cambridge University Press.