



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

COURSE TITLE: INORGANIC CHEMISTRY
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	:	04
Title of the Course	:	Inorganic Chemistry
Course Code	:	S512CHT
Name of the Vertical in adherence to NEP 2020	:	Compulsory Major
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

Paper No.- III

Course Title: Inorganic Chemistry

No. of Credits - 04

Type of Vertical: Compulsory Major

COURSE CODE: S512CHT

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 the different types of reactions in octahedral complexes.
CLO-02	Understand	explain the properties, preparation method of organometallic complexes and sources, toxicity, biological effects and treatment for different trace metals.
CLO-03	Apply	illustrate factors affecting rate of reactions.
CLO-04	Analyse	calculate the total valence electrons of complexes and illustrate structure and mechanism of action of different biological carriers.

Syllabus for First Year of Master of Science in Chemistry

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SEMESTER-II

Paper No.- III

Course Title: Inorganic Chemistry

No. of Credits - 04

Type of Vertical: Compulsory Major

COURSE CODE: S512CHT

COURSE CONTENT			
Module No.	Content	Credits	No. of Hours
1	<p>UNIT-I: Inorganic Reaction Mechanism</p> <ul style="list-style-type: none"> ○ Rate of reactions, factors affecting the rate of reactions, techniques for determination of rate of reaction (Direct chemical analysis, spectrophotometric method, electrochemical and flow methods). ○ Ligand substitution reactions of: <ul style="list-style-type: none"> a) Octahedral complexes without breaking of metal-ligand bond (Use of isotopic labelling method) b) Square planar complexes, trans-effect, its theories and applications. Mechanism and factors affecting these substitution reactions. ○ Redox reactions: inner and outer sphere mechanisms, complimentary and non-complimentary reactions. ○ Stereochemistry of substitution reactions of octahedral complexes. (Isomerization and racemization reactions and applications). 	01	15
2	<p>UNIT-II: Organometallic Chemistry of Transition Metals</p> <ul style="list-style-type: none"> ○ Eighteen and sixteen electron rule and electron counting with examples. ○ Preparation and properties of the following compounds <ul style="list-style-type: none"> (a) Alkyl and aryl derivatives of Pd and Pt complexes (b) Carbenes and carbynes of Cr, Mo and W (c) Alkene derivatives of Pd and Pt (d) Alkyne derivatives of Pd and Pt (e) Allyl derivatives of nickel (f) Sandwich compounds of Fe, Cr and Half Sandwich compounds of Cr, Mo. ○ Structure and bonding on the basis of VBT and MOT in the following organometallic compounds: Zeise's salt, 	01	15

	bis(triphenylphosphine)diphenylacetylene platinum (0) [Pt(PPh ₃) ₂ (HC≡CPh) ₂], diallylnickel(II), ferrocene and bis(arene)chromium(0), tricarbonyl (η^2 -butadiene) iron(0)		
3	<p>UNIT-III: Environmental Chemistry</p> <ul style="list-style-type: none"> ○ Conception of Heavy Metals: Critical discussion on heavy metals ○ Toxicity of metallic species: Mercury, lead, cadmium, arsenic, copper and chromium, with respect to their sources, distribution, speciation, biochemical effects and toxicology, control and treatment. ○ Case Studies: (a) Itai-itai disease for Cadmium toxicity, (b) Arsenic Poisoning in the Indo-Bangladesh region. ○ Interaction of radiation in context with the environment: Sources and biological implication of radioactive materials. Effect of low level radiation on cells- Its applications in diagnosis and treatment, Effect of radiation on cell proliferation and cancer. 	01	15
4	<p>Unit-IV: Bioinorganic Chemistry</p> <ul style="list-style-type: none"> ○ Biological oxygen carriers; hemoglobin, hemerythrene and hemocyanine- structure of metal active center and differences in mechanism of oxygen binding, Differences between hemoglobin and myoglobin: Cooperativity of oxygen binding in hemoglobin and Hill equation, pH dependence of oxygen affinity in hemoglobin and myoglobin and it's implications. ○ Activation of oxygen in biological system with examples of mono-oxygenases, and oxidases- structure of the metal center and mechanism of oxygen activation by these enzymes. ○ Copper containing enzymes- superoxide dismutase, tyrosinase and laccase: catalytic reactions and the structures of the metal binding site ○ Nitrogen fixation-nitrogenase, hydrogenases ○ Metal ion transport and storage: Ionophores, transferrin, ferritin and metallothionins. ○ Medicinal applications of cis-platin and related compounds. 	01	15
	Total	4	60

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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