



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

**COURSE TITLE: ADVANCE INSTRUMENTAL TECHNIQUES-I
SEMESTER-III
W.E.F. 2024-2025**

**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:

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	:	Second Year
Semester	:	Third
No. of Credits	:	04
Title of the Course	:	Advance Instrumental Techniques-I
Course Code	:	S602CHT
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
Level	:	PG
Pattern of Marks Distribution for SEE and CIA	:	60:40
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2024-2025
Ordinances /Regulations (if any)	:	

Syllabus for Second Year of Master of Science in Chemistry

(With effect from the academic year 2024-2025)

SEMESTER-III

Paper No- II

Course Title: Advance Instrumental Techniques-I

No. of Credits - 04

Type of Vertical: Compulsory Major

Course Code: S602CHT

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 basic concept of instrumental techniques
CLO-02	Understand	Explain principle involved in spectral, Electro analytical and Miscellaneous technique.
CLO-03	Apply	Illustrate application involved in spectral, Electro analytical method and miscellaneous techniques.
CLO-04	Analyze	Explain instrumentation involved in spectral, Electro analytical method and Miscellaneous technique.

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SEMESTER-III

Paper No- II

Course Title: Advance Instrumental Techniques-I

No. of Credits - 04

Type of Vertical: Compulsory Major

Course Code: S602CHT

COURSE CONTENT			
Module No.	Content	Credits	No. of Hours
1	<p>Unit 1: Spectral Method -I</p> <ul style="list-style-type: none"> • Surface Analytical Techniques: Preparation of the surface, difficulties involved in the surface analysis • Principle, instrumentation and applications of the following: Secondary Ion mass spectroscopy, Particle-Induced X-Ray Emission ,Low-Energy Ion Scattering and Rutherford Backscattering . 	01	15
2	<p>Unit 2: Spectral Method -II</p> <p>Principle, Instrumentation, and Applications of</p> <ul style="list-style-type: none"> • Electron Spin Resonance Spectroscopy (ESR) • Mossbauer's Spectroscopy • Atomic Emission Spectroscopy- based on plasma and electrical discharge sources. 	01	15
3	<p>Unit 3: Electroanalytical Method</p> <ul style="list-style-type: none"> • Current Sampled (TAST) Polarography, Normal and Differential Pulse Polarography • Potential Sweep methods- Linear Sweep Voltammetry and Cyclic voltammetry. • Potential Step method- Chronoamperometry • Controlled potential technique- Chronopotentiometry • Stripping Voltammetry- anodic, cathodic, and adsorption • Chemically and electrolytically modified electrodes and ultra- microelectrodes in voltammetry 	01	15
4	<p>Unit 4- Miscellaneous Technique</p> <p>Principle, Instrumentation and Applications of:</p> <ul style="list-style-type: none"> • Chemiluminescence techniques • Chiroptical Methods : ORD, CD • Photoacoustic spectroscopy • Spectroelectrochemistry 	01	15

	Total	4	60
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Access to the Course

The course is available for second year 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:

1. Analytical Chemistry, G. D. Christian, 4th Ed. John Wiley, New York (1986)
2. Fundamentals of Analytical Chemistry, D. A. Skoog and D. M. West and F. J. Holler Holt- Saunders 6th Edition (1992)
3. Principles of Instrumental Analysis, D. A. Skoog, F. J. Holler and J.A. Niemann, 5th Edition (1998)
4. Instrumental Methods of Analysis, H. H. Willard, L. L. Merritt, Jr. J. A. Dean and F. A. Settle Jr 6th Ed CBS (1986)
5. Instrumental Methods of Analysis, H. H. Willard, L. L. Merritt Jr, J. A. Dean and F. A. Settle Jr 7th Ed CBS (1986)
6. Introduction to Instrumental Analysis, R. D. Braun, Mc Graw Hill (1987)
7. Electrochemical Methods, A. J. Bard and L.R. Faulkner, John Wiley, New York, (1980)
8. Electroanalytical Chemistry, J.J . Lingane, 2nd Ed Interscience, New York (1958)
9. Modern Polarographic Methods in Analytical Chemistry, A. M. Bond, Marcel Dekker, New York, 1980.
10. Electroanalytical Chemistry, Ed A. J. Bard and Marcel Dekker, New York, (A series of volumes)
11. Techniques and mechanism of electrochemistry, P. A. Christian and A. Hamnett, Blachie Academic and Professional (1994)
12. Wilson and Wilson's Comprehensive Analytical Chemistry, Ed. G. Svehla. (A series of Volumes)
13. Treatise on Analytical Chemistry, Eds. I. M. Kolthoff and Others, Interscience Pub. (A series of volumes).
14. Standard Methods of Chemical Analysis, Eds. F. J. Welcher, Robert E. Krieger Publishing Company, (A series of volumes)
15. Polarographic Methods in Analytical Chemistry, M. G. Arora, Anmol Publications Pvt Ltd

