

**UNIVERSITY OF MADRAS**  
**B.Sc. DEGREE PROGRAMME IN CHEMISTRY**  
 SYLLABUS WITH EFFECT FROM 2023-2024

<b>Title of the Course</b>	<b>Quantitative Inorganic Estimation (titrimetry) and Inorganic Preparations</b>						
<b>Paper No.</b>	<b>Core II</b>						
<b>Category</b>	<b>Core</b>	<b>Year</b>	I	<b>Credits</b>	2	<b>Course Code</b>	124C11
		<b>Semester</b>	I				
<b>Instructional hours per week</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>		<b>Total</b>		
	-	-	3		3		
<b>Prerequisites</b>	Higher secondary chemistry						
<b>Objectives of the course</b>	This course aims at providing knowledge on <ul style="list-style-type: none"> <li>• laboratory safety</li> <li>• handling glassware</li> <li>• Quantitative estimation</li> <li>• preparation of inorganic compounds</li> </ul>						
<b>Course Outline</b>	<b>Unit I</b>						
	<p><b>Chemical Laboratory Safety in Academic Institutions</b></p> <p>Introduction - importance of safety education for students, common laboratory hazards, assessment and minimization of the risk of the hazards, prepare for emergencies from uncontrolled hazards; concept of MSDS; importance and care of PPE; proper use and operation of chemical hoods and ventilation system; fire extinguishers-types and uses of fire extinguishers, demonstration of operation; chemical waste and safe disposal.</p> <p><b>Common Apparatus Used in Quantitative Estimation (Volumetric)</b></p> <p>Description and use of burette, pipette, standard flask, measuring cylinder, conical flask, beaker, funnel, dropper, clamp, stand, wash bottle, watch glass, wire gauze and tripod stand.</p> <p><b>Principle of Quantitative Estimation (Volumetric)</b></p> <p>Equivalent weight of an acid, base, salt, reducing agent, oxidizing agent; concept of mole, molality, molarity, normality; primary and secondary standards, preparation of standard solutions; theories of acid-base, redox, complexometric, iodimetric and iodometric titrations; indicators – types, theory of acid–base, redox, metal ion and adsorption indicators, choice of indicators.</p>						
<b>Unit II</b>							
<p><b>Quantitative Estimation (Volumetric)</b></p> <p>Preparation of standard solution, dilution from stock solution</p> <p><b>Permanganometry</b></p> <p>Estimation of oxalic acid using standard oxalic acid</p>							

**UNIVERSITY OF MADRAS**  
**B.Sc. DEGREE PROGRAMME IN CHEMISTRY**  
 SYLLABUS WITH EFFECT FROM 2023-2024

	<p><b>Dichrometry</b>                      Estimation of ferric alum using standard dichromate (external indicator)</p> <p><b>Iodometry</b>                      Estimation of copper in copper sulphate using standard dichromate</p> <p><b>Argentometry</b>                      Estimation of chloride in barium chloride using standard sodium chloride/</p>
	<p><b>Unit III</b>  <b>Complexometry</b>                      Estimation of hardness of water using EDTA</p> <p><b>Estimations</b>                      Estimation of ascorbic acid.</p> <p><b>Preparation of Inorganic compounds:</b>                      a. Tetraammine copper (II) sulphate                      b. Hexamminecobalt (III) chloride                      c. Mohr's Salt</p>
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	<p><b>Reference Books:</b></p> <p>1. Venkateswaran, V.; Veeraswamy, R.; Kulandivelu, A.R. <i>Basic Principles of Practical Chemistry</i>, 2<sup>nd</sup>ed.; Sultan Chand &amp; Sons: New Delhi, 1997.</p> <p>2. Nad, A. K.; Mahapatra, B.; Ghoshal, A.; <i>An advanced course in Practical Chemistry</i>, 3<sup>rd</sup>ed.; New Central Book Agency: Kolkata, 2007.</p>
Reference Books	1. Mendham, J.; Denney, R. C.; Barnes, J. D.; Thomas, M.; Sivasankar, B.; <i>Vogel's Textbook of Quantitative Chemical Analysis</i> , 6 <sup>th</sup> ed.; Pearson Education Ltd: New Delhi, 2000.
Website and e-learning source	<p><b>Web References:</b></p> <p>1) <a href="http://www.federica.unina.it/agraria/analytical-chemistry/volumetric-analysis">http://www.federica.unina.it/agraria/analytical-chemistry/volumetric-analysis</a></p> <p>2) <a href="https://chemdictionary.org/titration-indicator/">https://chemdictionary.org/titration-indicator/</a></p>
<p><b>Course Learning Outcomes (for Mapping with POs and PSOs)</b></p> <p><b>On successful completion of the course the students should be able to</b></p> <p><b>CO1:</b> explain the basic principles involved in titrimetric analysis and inorganic preparations.</p> <p><b>CO2:</b> compare the methodologies of different titrimetric analysis.</p> <p><b>CO3:</b> calculate the concentrations of unknown solutions in different ways and develop the skill to estimate the amount of a substance present in a given solution.</p> <p><b>CO4:</b> assess the yield of different inorganic preparations and identify the end point of various titrations.</p>	

**UNIVERSITY OF MADRAS**  
**B.Sc. DEGREE PROGRAMME IN CHEMISTRY**  
**SYLLABUS WITH EFFECT FROM 2023-2024**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	S	S	S	S	M	S	M
<b>CO2</b>	M	S	S	S	M	S	S	M	M	M
<b>CO3</b>	S	S	S	M	S	S	S	M	S	M
<b>CO4</b>	S	S	S	S	S	S	S	M	M	M

**CO-PO Mapping (Course Articulation Matrix)**

<b>CO /PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>Weightage</b>	12	12	12	12	12
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0