



**SECOND-YEAR OF BACHELOR OF SCIENCE
VOCATIONAL SKILL COURSE RELATED TO DSC
REVISED SYLLABUS ACCORDING TO CBCS
NEP2020**

**COURSE TITLE: LABORATORY SKILLS IN ANALYTICAL CHEMISTRY-2
SEMESTER-IV
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	:	Bachelor of Science
Name of the Department	:	Chemistry
Name of the Class	:	Second Year
Semester	:	Fourth
No. of Credits	:	02
Title of the Course	:	Laboratory Skills in Analytical Chemistry-2
Course Code	:	CHVS202
Name of the Vertical in adherence to NEP 2020	:	Vocational Skill Course (VSC)
Eligibility for Admission	:	Any student admitted to Second Year of B.Sc. Degree Programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra
Passing Marks	:	40%
Mode of Assessment	:	Summative at the end of semester
Level	:	UG
Pattern of Marks Distribution for SEE	:	100 %
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2024-2025
Ordinances /Regulations (if any)		

Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce and Vid. Dadasaheb Pitre Science College, Devrukh (An Autonomous College Affiliated with University of Mumbai)

Syllabus for Second Year of Bachelor of Science in Chemistry

(With effect from the academic year 2024-2025)

SEMESTER-IV

Course Title: Laboratory Skills in Analytical Chemistry-2

No. of Credits - 02

Type of Vertical: Vocational Skill Course (VSC)

COURSE CODE: CHVS202

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	Understand	understand the principle, handling, care and maintenance of the laboratory equipments.
CLO-02	Apply	apply the principles of instrumental methods of chemical analysis in actual practice.

Syllabus for Second Year of Bachelor of Science in Chemistry**(With effect from the academic year 2024-2025)****SEMESTER-IV****Course Title: Laboratory Skills in Analytical Chemistry-2****No. of Credits - 02****Type of Vertical: Vocational Skill Course (VSC)****COURSE CODE: CHVS202**

COURSE CONTENT			
Module No.	Content	Credits	No. of Hours
1	<p>1. Tools of Analytical Chemistry-II</p> <p>a. Filtration Flasks, Funnels, Separating Funnels, Distillation apparatus, Vacuum Distillation assembly, Centrifuge machine, Electrophoresis apparatus.</p> <p>b. Development chamber for chromatography</p> <p>c. Electrodes like Reference Electrodes and Indicator Electrodes (with respect to care and maintenance.)</p> <p>d. Conductivity cell (with respect to care and maintenance.)</p> <p>e. Combined Glass electrode (with respect to care and maintenance.)</p> <p>f. Types of Salt Bridges and preparation of any one or use of salt bridge, its effect on the potential of a given electrode/cell</p> <p><i>(The learner should draw diagrams and write-ups providing uses of the items mentioned in (a and b) and Principle, Construction care and Uses of items (c) to (f) in his journal.)</i></p> <p>2. Paper chromatography: Separation of cations like Fe(III), Ni(II) and Cu(II) in a sample.</p> <p>3. Thin Layer Chromatography (TLC): Separation and visualization of organic compounds, calculation of R_f values</p> <p>4. Separation of a solute between two immiscible solvents to determine the distribution ratio and/or extraction efficiency. (Solutes could be as their aqueous solutions and the organic solvent ethyl acetate) Suggested solute for the distribution study: Fe(III) in aqueous solutions.</p> <p><i>(The learner is expected to learn the technique of solvent extraction by using separating funnel, method to estimate the concentrations of the solute distributed in the two immiscible phases, determination of the extraction efficiency)</i></p>	02	60

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	<p>5. Conductometric titration: Estimation of given acid by conductometric titration with strong base and calculation of % error. <i>(The learner is expected to learn the handling of the conductometer and the conductivity cell, determination of end point by plotting a graph. They are also expected to state the error estimate of their results).</i></p> <p>6. Estimation of Fe(II) in the given solution by titrating against K₂Cr₂O₇ potentiometrically and calculation of % error. <i>(The learner is expected to learn the handling of the potentiometer, use of Platinum electrode and reference electrode like SCE. They will learn to determine end point by plotting a graph. They are also expected to state the error estimate of their results).</i></p> <p>7. Gravimetric estimation of Sulphate as BaSO₄ and calculation of % error. <i>(The learner is expected to write a balanced chemical reaction, need for digestion of the precipitate and the skill required to carry out the incineration and to estimate the % error.)</i></p> <p>8. Determination of the Concentration of an Unknown KMnO₄ Solution by colorimetrically. <i>(The learner is expected to understand the principle of Beer-Lambert Law, calculation of λ_{max}, calibration curve method)</i></p>		
	Total	02	60

Access to the Course

The course is available for all students who have admitted to Second Year of B.Sc. Degree Programme.

Methods of Assessment

Practical Courses, Vocational Skill Courses, Skill Enhancement Courses and the courses having laboratory sessions shall be assessed at the end of each semester.

References:

1. Vogel's textbook of quantitative chemical analysis, Sixth Ed. Mendham, Denny, Barnes, Thomas, Pearson education
2. Standard methods of chemical analysis, F. J. Welcher
3. Standard Instrumental methods of Chemical Analysis, F. J. Welcher
4. W. W. Scott "Standard methods of Chemical Analysis", Vol. I, Van Nostrand Company, Inc., 1939.
5. E. B. Sandell and H. Onishi, "Spectrophotometric Determination of Traces of Metals", Part II, 4th Ed., A Wiley Interscience Publication, New York, 1978.