

Shivaji University, Kolhapur



Accredited By NAAC with 'A++' Grade

Syllabus for
Bachelor of Science Part-II
(B. Sc. II)
VOCATIONAL SKILL COURSE
IN
CHEMISTRY
(NEP-2.0)

To be implemented from
June 2025 onwards

Structure of B. Sc. II Chemistry (Major Specific)

Vocational Skill Course in Chemistry

Sr. No.	Semester	Course Code	Title of Paper
1	III	BSU0325VSP207C01	PRCHVSC-301 Vocational Skill Course in Chemistry Practical Paper-I (2 credits, 60 Hours)

VOCATIONAL SKILL COURSES

B. Sc. II, Semester III, VSC Practical Paper-I		
BSU0325VSP207C01	PRCHVSC-301 Vocational Skill Course in Chemistry Practical Paper-I	Credits: 2 Hours: 60

Course Outcomes:

After completion of the course, the students will be able to:

- C01 Understand the concepts, principles, theories and practical applications of Chemistry
- C02 Understand the simple techniques of synthesis and analysis
- C03 Gain basic knowledge of instruments to be used for analysis.
- C04 Develop analytical skills

Practicals:

Note: An explanation and understanding of theoretical concepts, mechanisms, reactions, and instrumentation are expected.

- 1) Preparation of Orange II Azo dye from Sulphanilic acid.
- 2) Determine the amount glycine from given solution.
- 3) Determination of viscosity coefficient of unknown solvents using Ostwalds Viscometer.
- 4) Determination of surface tension of soap solution using a stalagmometer,
- 5) Analysis of vinegar sample using conductivity measurements.
- 6) Preparation of standard sodium carbonate solution, standardization of HCl solution and determination of sodium carbonate and sodium bicarbonate in the given solution.
- 7) Determination of C.O.D. in polluted water.
- 8) Determination of pH of the following biological Juices. (i) Milk (ii) Orange Juice (iii) Lime water (iv) Lemon Juice
- 9) Identification of aldehydes and ketones using i) Brady's Test ii) Tollen's Test iii) Schiff Test iv) Iodoform Test
- 10) Preparation of tetrammine copper (II) sulphate.
- 11) Gravimetric estimation of aluminium as Aluminium oxinate from a

solution containing aluminium sulphate or potash alum and free sulphuric acid.

- 12) To determine the λ_{max} of KMnO_4 solution using a Colorimeter.
- 13) Determination of sulphate from drinking water using Conductivity measurements.
- 14) Determination of alkali contents from antacid tablet using Conductivity measurements.
- 15) Determine the density and Refractive index of given unknown liquids.
- 16) Separation of liquid + liquid binary mixture by using distillation method.
- 17) Identify and differentiate the amines using functional group tests.
- 18) Determination of reducing sugars and non-reducing sugars.

References:

1. Fundamentals of Analytical Chemistry; Skoog, West. Holler and Crouch 9th edition; Mary Finch. (2014).
2. Vogel's Textbook of Quantitative Chemical Analysis; 6th edition, Pearson Education Limited, (2007).
3. Industrial Chemistry by B. K. Sharma.
4. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co: New Delhi (2011).
5. Findlay's Practical Physical Chemistry (Longman) 2015.
6. Practical Physical Chemistry: Gurtu (S Chand) 2014.
7. Systematic Experimental Physical Chemistry: Rajbhoj, Chandekar (Anjali Publication) 2016.
8. Advanced Practical Physical Chemistry: J.B. Yadav (Goel Publishing House) 2015.
9. Vogel's Textbook of Quantitative Inorganic Chemistry by A. I. Vogel.
10. Physical Chemistry of Inorganic Qualitative Analysis by Kuricose & Rajaram.
11. Advanced Practical Organic Chemistry by N.K. Vishnoi. Vikas Publishing House Private Limited.

B.Sc. II Syllabus (NEP-2.0)
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VOCATIONAL SKILL COURSE

Semester III

Nature of Practical Exam

No. of Examination Days- 01

Semester-III Practical Paper-I (50 Marks)

Q. 1 Experiment I- 20 Marks

Q. 2 Experiment II - 20 Marks

Q. 3 Oral - 5 Marks

Q. 4 Journal- 5 Marks

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Syllabus for

Bachelor of Science Part-II

(B. Sc. II)

COMMUNITY ENGAGEMENT PROGRAMME (CEP)

IN CHEMISTRY

(NEP-2.0)

To be implemented from

June 2025 onwards

Structure of B. Sc. II

in Chemistry

Sr. No.	Semester	Course Code	Title of Paper
1	IV	BSU0325CEP207D01	CHCEP-401 Community Engagement Programme in Chemistry (2 credits, 60 Hours)

B. Sc. II, Semester IV		
BSU0325CEP207D01	CHCEP-401 Community Engagement Programme in Chemistry Paper-I	Credits: 2 Hours: 60

INTRODUCTION:

New generation of students are increasingly unaware of local rural and peri-urban realities surrounding their HEIs, as rapid urbanization has been occurring in India. A large percentage of Indian population continues to live and work in rural and peri-urban areas of the country. While various schemes and programs of community service have been undertaken by HEIs, there is no singular provision of a well- designed community engagement course that provides opportunities for immersion in rural realities. Such a course will enable students to learn about challenges faced by vulnerable households and develop an understanding of local wisdom and lifestyle in a respectful manner

OBJECTIVES:

- To promote a respect for rural culture, lifestyle, and wisdom among students.
- To learn about the present status of agricultural and development initiatives.
- Identify and address the root causes of distress and poverty among vulnerable households.
- Improve learning outcomes by applying classroom knowledge to real-world situations.

To achieve the objectives of the socio-economic development of New India, HEIs can play an important role through active community engagement. This approach will also contribute to improve the quality of both teaching and research in HEIs in India. India is a signatory to the global commitment for achieving Sustainable Development Goals (SDGs) by 2030. Achieving these 17 SDG goals requires generating locally appropriate solutions. Community engagement should not be limited to a few social science disciplines alone. It should be practiced across all disciplines and faculties of HEIs. These can take the forms of enumerations, surveys, awareness camps and campaigns, training, learning manuals/films, maps, study reports, public hearings, policy briefs, cleanliness

and hygiene teachings, legal aid clinics, etc. For example, students of chemistry can conduct water and soil testing in local areas and share the results with the local community. Students of science and engineering can undertake research in partnership with the community on solid and liquid waste disposal. Therefore, students are being encouraged to foster social responsibility and community engagement in their teaching and research.

LEARNING OUTCOMES:

After completing this course, students will be able to

1. Gain an understanding of rural life, Indian culture, and social realities.
2. Develop empathy and bonds of mutuality with the local community.
3. Appreciate the significant contributions of local communities to Indian society and economy.
4. Learn to Value local knowledge and wisdom.
5. Identify opportunities to contribute to the community's socioeconomic improvement.

Credits: Two credit Course; Students are expected to complete 60 hours of participation

COURSE STRUCTURE:

Sr.	Module Title	Module Content	Teaching/ Learning/ Methodology
1	Understanding CEP	Introduction, Guidelines, Necessities	Classroom discussions, Field visit. Survey, Individual / Group conference, Report submission & VIVA
2	Identification of the topic and area	Use of survey, Field visits, communication with society	
3	Organization of Activities	Organization of Hands on Training, Exhibitions, lectures, community conferences	
4	Project	Detailed report of the outcome of the works	

Note: Faculty can make addition in the list of activities as per domain content:

Recommended field-based activities (Tentative):

A community engagement program in chemistry generally aims to increase public understanding and appreciation of chemistry. It encourages engagement with scientific knowledge. These programs can involve activities like open days, workshops, exhibitions, awareness lectures, conducting surveys and partnerships with local schools to provide hands-on chemistry experiences.

Types of Engagement:

1. Demonstrations and Workshops:

- Showcasing chemistry through practical demonstrations and hands-on workshops

By making chemistry more accessible and relatable, community engagement can help the public understand its role in everyday life. For example, visits elementary schools with chemistry experiments.

2. Open Days and Science Festivals, exhibitions:

- Hosting open days and organization of science festivals allows the community to interact with chemists and learn about their work in an informal setting.

3. Educational Outreach to Schools:

- Collaborating with local schools to offer chemistry programs or demonstrations can inspire young people to consider a career in science. Exposing young people to the excitement of chemistry can encourage them to pursue careers in Chemistry.

4. Community-Based Research:

- Community-based research can help identify and address environmental or social problems that affect the community.
- Engaging with the community on projects related to chemistry, such as soil testing, waste management, drinking water analysis, Use of renewable sources of energy,

Adverse effects of pesticides, disadvantages of plastic, microplastic, pollution due to industry effluent etc.

5. Surveys:

- Building solar powered village
- Energy use and fuel efficiency surveys
- Raising Awareness about Chemical Hazards
- Assessing the impact of chemical pollution on human health and the environment.
- Gathering feedback on the effectiveness of waste management programs.
- Measuring public support for stricter chemical regulations and industry standards.
- Evaluating public awareness and attitudes towards pesticide use and regulations.
- Evaluating the societal benefits of new chemical technologies, such as renewable energy sources. Etc...

6. Any other activity addressing issues related to Chemistry can be added.

IMPORTANT RULES AND REGULATIONS FOR CEP:

Concurrent Fieldwork:

1. Students must conduct comprehensive studies on various challenges that they face in their chosen field. Every work relevant to the subject matter should be compiled and documented.
2. Students should keep separate fieldwork diary or maintain journal in order to record their fieldwork experiences i.e. reading, e- contents, tasks, planning and work hours have to be recorded in the diary. Detailed work records report on students' fieldwork experiences and activities to be submitted and should be presented. The fieldwork conference is part of the timetable and is mandatory. Faculty should hold a fieldwork conference FOREIGHTNIGHTLY for all students.

3. In addition to the principal curriculum, the students engage in a variety of community development- related activities. They are encouraged to plan and carry out programs, processions, and events for social causes. These activities seek to enhance students' personal and professional skills as well as foster self-development.

Reference

1. Guidelines on "Fostering Social Responsibility & Community Engagement in Higher Education Institutions in India 2.0 (<https://www.ugc.gov.in/publication/ebook>)
2. Shivaji University Guidelines regarding CEP. (<https://www.unishivaji.ac.in/uploads/syllabus/2024/JULY/BOS/23-July/All%20Bachelor%20Degree%20Programmes%20CEP%202024-25.pdf>)

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B.Sc. II Syllabus (NEP-2.0)
To be implemented from June 2025 onwards

Name of College
COMMUNITY ENGAGEMENT PROGRAMME (CEP)
IN CHEMISTRY

Diary

Name of Student:	Roll No.
Exam Seat No:	

Sr. No.	Date	Activity	Type of Activity	Time Duration	Sign of Student	Signature of Teacher
1						
2						
3						
4						

- Total 60 Hours participation is required.

Teacher in Charge

H.o.D.

Principal

Shivaji University, Kolhapur

B.Sc. II Syllabus (NEP-2.0)

Name of College

**COMMUNITY ENGAGEMENT PROGRAMME (CEP)
IN CHEMISTRY**

Format of Report

- Front Page
- Certificate
- Index
- Introduction
- Diary
- Surveys/Field Visits
- Activities- Detail Report
- Summary and Findings and outcome

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Semester IV

Evaluation/ASSESSMENT SCHEME:

The assessment pattern is internal and external i.e. 40+10.

Particulars	Marks
Internal continuous Assessment:	
1. Participation in concurrent field visits (40%)	
a) Diary Completion, Attendance	10
b) Surveys/Field Visits	10
2) Individual/group field project conference, report/journal submission (40%)	
a) Organization/Participation in activities	10
b) Project	10
Total	40
External Assessment: Presentation of project findings (VIVA) (20%.)	
Oral Examination	10
Total (Internal + External Assessment)	50

Note: Oral Examination will be conducted along with the Sem. IV Practical Examination.