



**GONDWANA UNIVERSITY GADCHIROLI**

**BHAGWANTRAO MEMORIAL SHIKSHAN SHANTHTA'S  
AHERI**

**BHAGWANTRAO ARTS AND SCIENCE COLLEGE ETAPALLI  
DIST. GADCHIROLI**

**SESSION 2022-23**

**UGC RECOGNIZED 2F AND 12B COLLEGE AFFILIATED TO  
GONDWANA UNIVERSITY GADCHIROLI**

**CERTIFICATE COURSE**

**ON**

**INTRODUCTION TO LAB SEFETY AND TECHNIQUES IN  
CHEMISTRY (LSTC)**

**BY**

**DEPARTMENT OF CHEMISTRY**

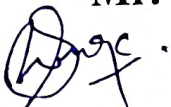
**COURSE COODINATOR**

**Dr. RAJIV B. DANGE (Head Dept. of Chemistry)**

**COURSE CO-CORDINATOR**


**Mr. BHARAT C. SONKAMBLE (Asstt. Prof. in Chemistry)**

**Mr. ATUL U. BARSAGADE (Asstt. Prof. in Chemistry)**

  
**Dr. Rajiv B. Dange**  
Head

Department of Chemistry  
Bhagwantrao Arts & Science  
College, Etapalli



  
**Principal**  
Bhagwantrao Arts & Science  
College, Etapalli Dist. Gadchiroli

Date: 15/10/2022

To,  
The Principal,  
Bhagwantrao Arts & Science College,  
Etapalli Di. Gadchiroli

**Subject:- Permission to start Certificate course in "Introduction to Lab Safety and Techniques in Chemistry (LSTC)"**

Respected Sir,

With reference to above cited subject, I would like to take permission to start Certificate Course in "Introduction to Lab Safety and Techniques in Chemistry (LSTC)" which will be organized and operated by the Department of Chemistry.

So you are kindly requested for the grant of permission to start this Certificate Course.

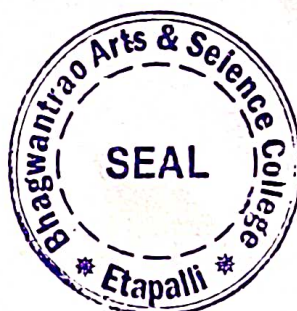


**Dr. Rajiv B. Dange**  
Head  
Department of Chemistry  
Bhagwantrao Arts & Science  
College, Etapalli

Forwarded through IQAC



**IQAC**  
Bhagwantrao Arts, Science College  
Etapalli, Dist. Gadchiroli



**Principal**  
Bhagwantrao Arts & Science  
College, Etapalli Dist. Gadchiroli



# **BHAGWANTRAO ARTS AND SCIENCE COLLEGE ETAPALLI DIST. GADCHIRO**

**ORGANIZER BY- DEPARTMENT OF CHEMISTRY**

**CERTIFICATE COURSE**

**ON**

**INTRODUCTION TO LAB SEFETY AND TECHNIQUES IN CHEMISTRY (LSTC)**

**SESSION: 2022-23**

## **Aims and Objective:**

- Students will explore various apparatus and their applications.
- The interested students will get the knowledge of standard operating procedures of instruments in chemical laboratory.
- The students will become more familiar with know how about handling and storage of chemicals in laboratory.
- The course will increase the frequency in lab handling and techniques.
- They will also turn towards applied chemistry fields in future.
- Will help to motivate students for further studies and developed their interest.
- They will aware about the hazardous and safety concern in lab.

## **Focus:**

To make student able to calibrate some specific glassware for making solutions with maximum possible accuracy is to store and handle chemicals like app to get prepared for performing experiments and analyzing using instruments with proper standard operating procedures.

## **Year of Implementation: 2022-23**

**Institute:** Bhagwantrao Arts and Science College Etapalli Dist. Gadchiroli

**Course coordinator:** Dr. Rajiv B. Dange (Head Dept. of Chemistry)

**Course Co- Coordinators:** 1. Mr. Bharat C. Sonkamble (Asstt. Prof.)

2. Mr. Atul U. Barsagade (Asstt. Prof.)

**Level:** Certificate

**Stream:** Science

**Course Duration:** 4 Months

**Teaching (Theory, Practical and Assessment) Duration:** 32 Hours

**Language:** English

**Intake Capacity:** 20 Seats

**Eligibility:** Qualifying in screening test offered to fresh batch students (Newly Admitted) for the Course Certificate.

**Academic Calendar For Student Course:** Three days in a week

**Available Infrastructure:** Institutional Chemistry Laboratory

**Supporting Non Teaching Staff:** Lab Attendant

**Examination Structure and Schedule:** At the end of course the examination will be conducted. Its notice and time table will be disturbed for communication to the students at least before 15 days of date of examination.

1. LSTCT01- 01 Theory Paper (Objective Type)= 60 Marks (Two Hours Exam)
2. LSTCT02- 02 Practical Paper (Objective Type)= 60 Marks (Three Hours Exam)
3. One Assignment= 10 Marks.

**Marking Scheme and Distribution:**

1. **Theory:** 30 MCQ Questions from 4 Units Each Carry 02 Marks= Total 60 Marks
2. **Practical:** Practical Exam 20 Marks + Viva Voce 05 Marks + Record 05 Marks= Total 30 Marks
3. **Internal Assessment:** 10 Marks

**Marking Scheme & Grading System:** Average of the marks obtained in each paper will be calculated as:  $60+30+10=100$  Marks

Sr. No.	Range of Percentage	Grade Obtained	Remark
1	85 and Above	O	Outstanding
2	75 to 84	A	Excellent
3	60 to 74	B	Very Good
4	45 to 59	C	Satisfactory
5	35 to 44	D	Poor
6	Below 34	-	Not Qualified

**Award of Certificate:** After successful completion of course, the certificate indicating grade will be awarded to the candidate.

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**Course Content: Syllabus/Program:**

**B.Sc. Part I (Semester - I)**

**LSTCT01– 01 Theory paper (objective type)**

**Paper - Introduction to Lab safety and Technique in Chemistry.**

**Total marks: 60**

**Total Lectures: 44**

**Note: Figures to the righthand side indicate number of lectures**

**UNIT I**

(A) Basic introduction of glassware, picture and its uses. [4 L]

(B) Basic introduction of apparatus, picture and its uses. [4 L]

**UNIT II**

(A) pH meter: instrumentation, calibration and operation, pH electrode, use of buffer solution, precaution and maintenance [3 L]

(B) Conductivity meter: instrumentation, conductivity cell, calibration of instrument operation and maintenance [3 L]

(C) Colorimeter: Introduction of instrument, cuvettes, determination of lambda max, filter setup, preparation of sample, operation, precautions and maintenance. [2 L]

**UNIT III**

(A) Safe storage of chemical in laboratories, principal of safe storage, storage facilities and storage of different materials. [4 L]

(B) Safe handling of chemical: general Guidelines, gathering general information on chemicals and how to carry chemical bottles in laboratories. [4 L]

**UNIT IV**

(A) Hazards, its type, recognizing hazards and routes of exposure.[4 L]

(B) Understanding chemical label, symbols, SDS and minimizing hazards.[4 L]



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## Chemistry Practical LSTCP01 – 01

Total Marks: 30

Paper-Introduction to Lab safety and Technique in Chemistry.

- 1) Calibrate the given pipette
- 2) Calibrate the pH meter using different buffer solution
- 3) Interpreting the storage criteria/conditions of given chemicals.
- 4) Identifying and interpreting labels/ symbols on chemical

### *Suggested References: -*

#### *Unit-I*

- Laboratory manual of Organic Chemistry by R.K Bansal (1994)
- Jensen, William (2006). "The origin of pyrex". Journal of Chemical Education. 83 (5): 692. Bibcode:2006JChEd..83..692J. doi:10.1021/ed083p692.
- Donnelly, Alan (March 1970). "History of Laboratory Glassware". Laboratory Medicine.
- Bhargava, Hemendra (1977). "Improved Recovery of Morphine from Biological Tissues Using Siliconized Glassware". Journal of Pharmaceutical Sciences. 66 (7): 1044–1045. doi:10.1002/jps.2600660738. PMID 886442.
- Castanheira, I. (2006). "Quality assurance of volumetric glassware for the determination of vitamins in food". Food Control. 17 (9): 719–726. doi: 10.1016/j.foodcont.2005.04.010.
- Zhang, Jia-Zhong (1999). "Laboratory glassware as a contaminant in silicate analysis of natural water samples". Water Research. 33 (12): 2879–2883. doi:10.1016/s0043-1354(98)00508-9.
- Campos, M.L.A.M. (2007). "Dissolved organic carbon in rainwater: Glassware decontamination and sample preservation and volatile organic carbon". Atmospheric Environment. 41 (39): 8924–8931. Bibcode:2007AtmEn.41.8924C. doi: 10.1016/j.atmosenv.2007.08.017.

#### *Unit-II*

- Advanced practical chemistry, Pragati Prakashan, Dr. Jagadamba Singh, Dr. L.D. S. Yadav, Dr. R.K.P. Singh, Dr. I.R. Siddiqui, Dr. Jaya Singhand and Dr. Jaya Shrivastav.
- Advanced practical chemistry, Book and Allied pt.Ltd. Raghupati Mukhopadhyay and Pratik Chatterjee.





- *College Practical Chemistry, University Press, V.K. Ahluwalia, Sunita Dlingra and Adarsh Gulati.*
- *Advanced practical Organic chemistry, Krishna Prakashan Media pt.Ltd. Goel Publishing house and Dr.O.P. Agrawal*

### **Unit-III**

- Laboratory manual of Organic Chemistry by R.K Bansal (1994)
- Guidance on Safe Storage of Chemicals in Laboratories, safety office, university of Nottingham (2012)
- Standard Operating Procedure for Chemical Handling and Storage (sunny Polytechnic Institute)
- Laboratory safety manual by NCBS (2016)
- Guidance on safe storage of laboratory chemicals by NERC (2010)


### **Unit-IV**

- Bretherick's Handbook of Reactive Chemical Hazards  
Compendium of reactivity hazards of individual elements or compounds, alone and in combination, with associated literature references. Section 1 covers specific chemical entries; Section 2 identifies well-defined groups of hazardous compounds. (2017, 8th edition)
- Sitting's Handbook of Toxic and Hazardous Chemicals and Carcinogens  
Critical data for more than 2200 important and/or regulated and monitored substances, and many associated substances. Substance records include regulatory listings, physical properties, incompatibilities, exposure limits, harmful effects and symptoms, first aid, storage, spill handling and more. (2012, 6th edition)
- Sax's Dangerous Properties of Industrial Materials  
Data on toxicology, flammability, reactivity, explosive potential, and regularity information for over 28,000 substances. Includes (when available): identification information, DPIM code, hazard rating, properties, synonyms, and toxicology data with references for reports of primary skin and eye irritation, mutation, reproductive, carcinogenic, and acute toxic dose data. (12th edition, 2012)
- Wiley Guide to Chemical Incompatibilities  
9000 chemical incompatibility profiles; covering flammability, violent and explosive binary reactions, incompatibilities, and reactions that may result from physical change. (2009, 3rd edition)
- Comprehensive Guide to the Hazardous Properties of Chemical Substances  
Handbook of safety data for organics, metals and inorganics, industrial solvents, common gases, particulates, explosives, and radioactive substances. Arranged by chemical structures and functional groups. Includes information on toxicity and carcinogenicity to flammability and explosive reactivity to handling and disposal practices. (2006, 3rd edition)





- **Destruction of Hazardous Chemicals in the Laboratory**  
Practical (specific and non-specific) procedures for the destruction of hazardous chemicals and biological agents in the laboratory in which they are used. Arranged by compounds and groups of compounds, including pharmaceuticals, with literature references. (2012, 3rd edition)
- **Dictionary of Substances and Their Effects**  
Vital information on 5,300 chemicals and their impact on the environment. Includes physical properties, occupational exposure, ecotoxicity, environmental fate, and mammalian and avian toxicity. (2005, 3rd edition)
- **Hazardous Chemicals Desk Reference**  
Safety profiles for 5,000 important hazardous chemicals. Quick overview of properties, hazards, and government agency standards. (6th edition, 2008)
- **Laboratory Safety for Chemistry Students (1st edition)**  
Undergraduate textbook on chemical laboratory safety. Topics: emergency response; recognizing, understanding and communicating about hazards; risk assessment; minimizing, controlling and managing hazards; and chemical management.
- **Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards**  
Guidance on planning procedures for the handling, storage, and disposal of chemicals. Offers prudent practices designed to promote safety and includes practical information on assessing hazards, managing chemicals, disposing of wastes, etc. (Revised, 2011)
- **Laboratory Waste Management: A Guidebook**  
Provide all levels of laboratory staff a guide for managing laboratory chemical wastes in compliance with federal and state environmental regulations. From the ACS Task Force on Laboratory and Chemical Waste Management (2012).
- **On the Practice of Safety**  
Safety practices textbook, covering "subjects and practices that today's safety professionals need to know in order to provide optimal protection for their organizations' property and personnel." (2013, 4th ed).
- **Guidelines for Laboratory Design: Health, Safety, and Environmental Considerations**  
Guide to designing "labs that make it possible to conduct scientific investigations in a safe and healthy environment." (4th edition, 2013)

  
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## Notice

Date: 01/01/2023

All students of semester second enroll in Chemistry Certificate Course for session 2022-23 are hereby informed that they have to submit assignments on topics given in list as per their serial number.

Note: Use A4 Paper.

Last Date of Submission: 25/02/2023

### Students list Enrolled in Chemistry Certificate Course for session 2022-23:

1. Buddhawar Gayatri Vivekanand
2. Walke Diksha Diwakar
3. Chittalwar Arati Sadu
4. Pujalwar Khushi Ashok
5. Odpalliwar Vivek Shriniwas
6. Pungati Ranjit Suku
7. Atram Jagdish Gurudas
8. Bulle Smruti Asaram
9. Chapale Kartik Shankar
10. Chapde Samir Nilkanth
11. Chittalwar Pawankumar Ramesh
12. Gawade Vina Lula
13. Haldar Isha Nirpen
14. Hedo Kiran Pramod
15. Hichami Rohan Isu
16. Hichami Sahil Ravji
17. Kangali Munni Bajju
18. Kangali Roshani Kishor
19. Karmarkar Prasanjit Rushi
20. Mujumdar Hema Tarak

**Dr. Rajiv B. Dange**  
Head

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Bhagwantrao Arts & Science  
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Bhagwantrao Memorial Shikshan Sanstha, Aheri's

**Bhagwantrao Arts & Science College, Etapalli**

**Dist- Gadchiroli**


Affiliated to Gondwana University, Gadchiroli

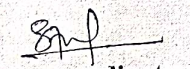
## CERTIFICATE

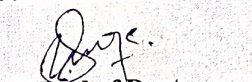
### INTRODUCTION TO LAB SEFETY AND TECHNIQUES IN CHEMISTRY (LSTC)

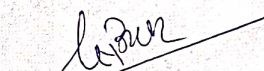
Awarded to Diksha D. Walke of B.Sc. Sem-II

for attending and completing, certificate course in "INTRODUCTION TO  
LAB SEFETY AND TECHNIQUES IN CHEMISTRY (LSTC)" Organized by  
Department of Chemistry during 01/01/2023 to 31/03/2023.

  
Co-coordinator

  
Co-coordinator

  
Head of Dept.  
Course Co-ordinator

  
Principal