



DEPARTMENT OF CHEMISTRY

MUHAMMED ABDURAHIMAN MEMORIAL ORPHANAGE (MAMO) COLLEGE

[Govt. Aided First Grade College & Affiliated to University of Calicut.
Re-Accredited by NAAC with A Grade]

CURRICULUM FOR CERTIFICATE COURSE

CERCH004: LABORATORY TECHNIQUES & SAFETY MEASURES

OFFERED DURING THE
ACADEMIC YEAR 2018-19
[APPROVED BY ACADEMIC COMMITTEE, MAMO COLLEGE]



MANASSERY, MUKKAM POST,
KOZHIKODE, KERALA, INDIA, 673 602.
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INSTITUTIONAL VISION, MISSION & OBJECTIVES 01



VISION

VISION: Build Scientifically Oriented, Intellectually Accomplished, Morally Upright and Socially Committed youth who can play a constructive role in Nation Building.



MISSION

MISSION: Intellectual, social and economic empowerment of the youth in general and women, minorities, orphans and the destitute in particular by providing quality, value-based higher-education.



OBJECTIVES

OBJECTIVES: Pursuit of Excellence, Harnessing technology, Thrust on value-based education, Nurturing Excellence and Moulding the youth for Nation Building



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VISION, MISSION, OBJECTIVES & CORE VALUES OF THE DEPARTMENT 02



VISION

VISION: To be a recognized model for educating students, prepared to compete in and contribute to the ever-changing, technology-centred world.



MISSION

MISSION: To encourage in the broadest and most liberal manner towards the advances in Chemistry through education by providing students with quality education.



OBJECTIVES: (a) To provide a broad foundation in Chemistry that stresses scientific reasoning and analytical problem solving with molecular perspective. (b) To provide students with skills required to perform laboratory experiments and data analysis. (c) Provide programmes that meet the educational and technical demands of the sub-disciplines. (d) Value-based training for ethical Conscience. (e) Inculcate critical and analytical thinking. (f) Apply fundamental chemical principles to gather and explain data.



VALUES

CORE VALUES: Innovation, Excellence, Ethical Consciousness, Service Mindedness, Professionalism and Global Outlook.



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B.Sc. POLYMER CHEMISTRY: PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) 03

After 4 to 5 years of graduation, the career and professional accomplishments attained by the B.Sc Polymer Chemistry Graduates would reflect that the programme really prepared the graduates to deal with the real world, where they could apply and use the skills and knowledge they have learned to good use.

Specifically, the graduate would be able to:



PEO1: Acquire the fundamental principles of Science and Chemistry with modern experimental and computational skills.



PEO2: Ability to handle problems of practical relevance to society while complying with economical, ethical and safety factors.



PEO3: Demonstrate professional excellence, ethics, soft skills and leadership qualities.



PEO4: Have sufficient breadth of understanding to enable continued professional development and lifelong learning throughout their career.



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B.Sc POLYMER CHEMISTRY: PROGRAMME SPECIFIC OUTCOME (PSOs) 04

On successful completion of a Bachelor Degree in Polymer Chemistry, the graduates would be able to:



PSO1: Gain the knowledge of Chemistry through theory and hands-on training.



PSO2: To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions.



PSO3: To familiarize with the emerging areas of Chemistry and their applications and to apprise the students of its relevance in future studies.



PSO4: Understand good laboratory practices and safety.



PSO5: To be conversant with the applications of Chemistry in day-to-day life.



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B.Sc POLYMER CHEMISTRY: PROGRAMME OUTCOMES (POs) 05

The students graduating from B.Sc Polymer Chemistry Programme should be able to:



PO1: Demonstrate, solve and an understanding of major concepts in all Disciplines of chemistry problems.



PO2: Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of chemical reactions.



PO3: Create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community.



PO4: Find out the green route for chemical reaction for sustainable development.



PO5: To inculcate the scientific temperament in the students and outside the scientific community.



PO6: Use modern techniques, recent equipment and software for leaning Chemistry.



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PO7: To demonstrate professional and ethical attitude with enormous responsibility to serve the society.



PO8: To apply contextual knowledge and modern tools of chemistry research for solving problems.



PO9: An understanding of professional, ethical, legal, security, social issues and responsibility.



PO10: Be acquainted with the contemporary issues latest trends in technological development and thereby innovate new ideas and solutions to existing problems.



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CERTIFICATE COURSE

CERCH004: LABORATORY TECHNIQUES & SAFETY MEASURES **06**

COURSE CURRICULUM

Course Name	Laboratory Techniques and Safety Measures
Course Code	CERCH004
Year	2018-19
Course Designer	Mr. Thrivikraman K
Couse Duration	30 Hrs
Course Schedule	November to February
Maximum Students Intake	60 Students



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CURRICULUM FOR CERTIFICATE COURSE - CERCH004

1. COURSE LEVEL

Fundamental, skill-oriented certificate/vocational programme.

2. PREREQUISITE

Basic of Physics, Chemistry and Mathematics.

3. COURSE INTAKE & ADMISSION

Maximum 60 students will be given admission to the course based on First-Come-First-Serve basis. All the students of the MAMO College are eligible for free enrolment for the course. The enrolment notification will be issued for the course well in advance of the commencement of the course.

4. COURSE COORDINATOR

Mr. Thrivikraman K, Assistant Professor, Department of Chemistry

5. COURSE PREAMBLE

Help to make learning about chemistry processes and concepts fun for your students with the lesson plans described in this course. Provide details about activities, projects and assignments. Students do in or outside the classroom to engage them in these topics.

6. DURATION

Total Duration: 30 Hrs. [Contact Hrs. 14Hrs., Lab Hours: 4 Hrs., Course Works: 6 and Assessment Works: 6 Hrs]

7. CURRICULUM FOCUS

Enhance the employability of the learners through curriculum enrichment for



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additional skill development.

8. COURSE OBJECTIVES

Learners are expected to

- (a) Work safety in a science lab
- (b) Know what to do in case of an accident
- (c) Know the basic lab safety rules, such as washing hands, following directions, not bringing food or drink into the lab and keeping the lab area clean
- (d) Wear appropriate lab attire.

9. SKILL EXPECTED

On the successful completion of the course, learners will be able to:

- a) Work safety in a science lab
- b) Know what to do in case of an accident
- c) Know the basic lab safety rules, such as washing hands, following
- d) Directions, not bringing food or drink into the lab and keeping the lab area clean

10. COURSE OUTCOMES

Upon the successful completion of the course, learners will be able to:

CO No	Course Outcome(CO)	Skill/Knowledge Attainment Level Based on Revised Bloom's Taxonomy
CO1	Know the basic lab safety rules, such as washing hands, following	Understand



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CO No	Course Outcome(CO)	Skill/Knowledge Attainment Level Based on Revised Bloom's Taxonomy
CO2	To apply first aids in laboratory	Apply
CO3	Develop risk assessments for scientific laboratories that use chemicals or biological organisms or both.	Evaluate

11. MAPPING OF COs WITH PSO_s AND PO_s

CO _s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	0	1	1	1	1	1	1	0	1	1	2	1	1
CO2	1	1	1	1	1	1	1	1	2	0	1	1	1	1	1
CO3	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1
CO4	1	1	1	1	1	1	1	1	2	0	1	1	2	1	1
AVG	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.5	0.0	1.0	1.0	1.5	1.0	1.0

12. MODULE-WISE COURSE CONTENTS

MODULE 1: LABORATORY SAFETY TECHNIQUES: PROTECTING PEOPLE AND EQUIPMENT

MODULE DURATION: 15 Hrs. [Contact Hrs. 9 Hrs., Lab Hrs: 2 Hrs, Course Woks: 3 and Assessment Works: 3]



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MODULE CONTENT: Awareness of Material Safety Data Sheet (MSDS). Storage and handling of chemicals. Simple first aids: Electric shocks, fire, cut by glass and inhalation of poisonous gases - Accidents due to acids and alkalis - Burns due to phenol and bromine. Disposal of sodium and broken mercury thermometer - Use of calcium chloride and silica gel in desiccators. – R & S Phrases (elementary idea only) – Personal Body Protection Containers and Substances Accidents and spills-

MODULE OUTCOME: Work safety in a science lab. Know what to do in case of an accident. Know the basic lab safety rules, such as washing hands, following directions, not bringing food or drink into the lab and keeping the lab area clear.

MODULE 2: THE IMPORTANCE OF LAB SAFETY

MODULE DURATION: 15 Hrs [Contact Hrs. 5 Hrs., Lab Hrs. 2 Hrs, Course Woks: 3 and Assessment Works: 3]

MODULE CONTENT: Important safety rules- infractions in safety - perform the correct safety procedures during lab-Biosafety Levels- (BSL-1-4). BSL-1 and BLS-2 organisms and their lab safety requirements. Basic Safety Rules- The goal of the Lab Research Safety Program

MODULE OUTCOME: List important safety rules, Identify infractions in safety, Comply with and perform the correct safety procedures during lab. Define Biosafety Levels (BSL-1-4). Compare and contrast BSL-1 and BLS-2 organisms and their lab safety requirements.

REFERENCES:

1. *Guidance in a Nutshell - Compilation of Safety Data Sheets*, European Chemicals Agency, Finland, Version 1.0, December 2013.



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2. D. A. Skoog, D. M. West, F. J. Holler, S. R. Crouch, *Fundamentals of Analytical Chemistry*, 8th Edn., Brooks/Cole, Thomson Learning, Inc., USA, 2004.
3. R. H. Hill, D. Finster, *Laboratory Safety for Chemistry Students*, 1st Edn., Wiley, Hoboken, NJ, 2010.
4. M. C. Day, J. Selbin, *Theoretical Inorganic Chemistry*, East West Press, New Delhi, 2002.
5. B. R. Puri, L. R. Sharma, K. C. Kalia, *Principles of Inorganic Chemistry*, 31st Edn., Milestone Publishers and Distributors, New Delhi, 2013.
6. Satya Prakash, *Advanced Inorganic Chemistry*, Vol. 1, 5th Edn., S. Chand and Sons, New Delhi, 2012.
7. J. Mendham, R. C. Denney, J. D. Barnes, M. Thomas, *Vogel's Text Book of Quantitative Chemical Analysis*, 6th Edn., Pearson Education, Noida, 2013

13. DELIVERY MODE

The course employs multi-mode delivery mechanism including contact lecture, online videos, and online and offline course works.

14. DELIVERY SCHEDULE

November to February.

15. DETAILED COURSE DELIVERY PLAN

Hour	Delivery Mode and Activity	Topics to be Covered
1	Contact Hour - 1: Classroom Discussion	Introducing the Course
2	Lab Hour - 1	Introducing the Lab
3	Contact Hour - 2: Classroom Demonstration	Awareness of Material Safety Data Sheet (MSDS).



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Hour	Delivery Mode and Activity	Topics to be Covered
4	Contact Hour - 3: Classroom Demonstration	Storage and handling of chemicals.
5	Contact Hour - 4: Classroom Demonstration	Simple first aids
6	Contact Hour - 5: Classroom Demonstration	Accidents due to acids and alkalis
7	Contact Hour - 6: Classroom Demonstration	Disposal of sodium and broken mercury thermometer.
8	Contact Hour - 7: Classroom Demonstration	Use of calcium chloride and silica gel in desiccators.
9	Contact Hour - 8: Classroom Demonstration	R & S Phrases
10	Contact Hour - 9: Classroom Demonstration	Personal Body Protection Containers and Substances Accidents and spills
11	Lab Hour - 2	Storage and handling of chemicals. Simple first aids.
12	Course Work – 1: Course Assignment	Assignment on chemical hygiene and its guidelines
13	Course Work – 2: Course Assignment	Course Assignment on Laboratory safety measures
14	Assessment Hour - 1	Quiz on Storage and handling of chemicals
15	Course Work – 3: Course Assignment	Course Assignment to make a chart of lab safety signs and symbols.
16	Assessment Hour - 2	Quiz on R&S Phrases.
17	Assessment Hour - 3	Test on module 1
18	Contact Hour - 10: Classroom Demonstration	Important safety rules



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Hour	Delivery Mode and Activity	Topics to be Covered
19	Contact Hour - 11: Classroom Demonstration	infractions in safety - perform the correct safety procedures during lab- Biosafety Levels- (BSL-1-4)..
20	Lab Hour - 3	Accidents due to acids and alkalies - Burns due to phenol and bromine. Disposal of sodium and broken mercury thermometer
21	Lab Hour - 4	Other safety measures
22	Contact Hour - 12: Classroom Demonstration	BSL-1 and BLS-2 organisms and their lab safety requirements.
23	Contact Hour - 13: Classroom Demonstration	Basic Safety Rules- The goal of the Lab Research Safety Program
24	Contact Hour - 14: Classroom Demonstration	Importance of safety in the lab.
25	Course Work – 4: Course Assignment	Assignment on Important safety rules
26	Course Work – 5: Course Assignment	Assignment on Safety violations in workplace
27	Course Work – 6: Course Assignment	Course Assignment to write notes on Basic Safety Rules- The goal of the Lab Research Safety Program
28	Assessment Hour - 4	Important safety rules
29	Assessment Hour - 5	Course End Assessment
30	Assessment Hour - 6	Course End Assessment

16. ASSESSMENT COMPONENTS

Total Marks: 100



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CLASSROOM AND GROUP PARTICIPATION: 20 Marks. This component aims at testing the course content understanding and the reflection skills and their attainment levels.

COURSE WORK: 30 Marks. This component aims at testing the skill attainment levels of the learners in analysing and implementing the real-world problem.

MID-COURSE ASSIGNMENT: 20 Marks. This component aims at testing the module-wise attainment levels of the course objectives and course outcome and module outcomes.

END-COURSE ASSESSMENT: 30 Marks. This component aims at testing overall attainment levels of the course with respect to course objectives, course outcome and module outcomes.

17. COURSE EVALUATION & GRADING

The course evaluation is done/coordinated entirely by the course coordinator. The following 10-point Indirect Grading System is used for awarding grades to students:

Percentage of Mark	Letter Grade	Interpretation	Class
95 and above	O	Outstanding	First Class with Distinction
85 to below 95	A+	Excellent	First Class with Distinction
75 to below 85	A	Very good	First Class with Distinction
65 to below 75	B+	Good	First Class
55 to below 65	B	Satisfactory	First Class
45 to below 55	C	Average	Second Class
35 to below 45	P	Pass	Third Class
Below 35	F	Failure	Fail
Incomplete	I	Incomplete	Fail



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Absent	Ab	Absent	Fail
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The grade is awarded by the course-coordinator by considering the overall performance of the learner in all the assessment component of the course.

18. GRIEVANCE REDRESSAL

The grievances, if any, can be submitted to the Head of the Department for its redressal. Those grievances that cannot be redressed by HoD can be forwarded to Academic Council of the College for final decision on the matter.

19. ISSUANCE OF CERTIFICATES

The Course Completion Certificate will be issued to all the successful candidates showing the Total Marks and Grade Obtained.



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