



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 **CERCH007: PROCESSING** **OF WASTE**

OFFERED DURING THE
ACADEMIC YEAR 2020-21
[APPROVED BY ACADEMIC COMMITTEE, MAMO COLLEGE]



MANASSERY, MUKKAM POST,
KOZHIKODE, KERALA, INDIA, 673 602.
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CONTENTS

1	INSTITUTIONAL VISION, MISSION & OBJECTIVES	3
2.	VISION, MISSION, OBJECTIVES & CORE VALUES OF THE DEPARTMENT	4
3.	B.Sc POLYMER CHEMISTRY: PEOs	5
4.	B.Sc POLYMER CHEMISTRY: PSOs	6
5.	B.Sc POLYMER CHEMISTRY: POs	7
6.	CERCH007: COURSE CURRICULUM	9
6.1.	COURSE LEVEL	10
6.2.	PREREQUISITE	10
6.3.	COURSE INTAKE & ADMISSION	10
6.4.	COURSE COORDINATOR	10
6.5.	COURSE PREAMBLE	10
6.6.	DURATION	10
6.7.	CURRICULUM FOCUS	10
6.8.	COURSE OBJECTIVES	11
6.9.	SKILL EXPECTED	11
6.10.	COURSE OUTCOMES	11
6.11.	MAPPING OF COs WITH PO AND PSOs	12
6.12.	MODULE-WISE COURSE CONTENTS	12
6.13.	DELIVERY MODE	13
6.14.	DELIVERY SCHEDULE	13
6.15.	DETAILED COURSE DELIVERY PLAN	14
6.16.	ASSESSMENT COMPONENTS	16
6.17.	COURSE EVALUATION & GRADING	16
6.18.	GRIEVANCE REDRESSAL	17
6.19.	ISSUANCE OF CERTIFICATES	17



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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

CERCH007: PROCESSING OF WASTE 06

COURSE CURRICULUM

Course Name	Processing of waste
Course Code	CERCH007
Year	2020-21
Course Designer	Mr. Trivikraman. K
Course Duration	30 Hrs
Course Schedule	June to September
Maximum Students Intake	60 Students



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CURRICULUM FOR CERTIFICATE COURSE - CERCH007

1. COURSE LEVEL

Fundamental, skill-oriented certificate/vocational programme.

2. PREREQUISITE

Basics of Chemistry and Biology.

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. Trivikraman K, Assistant Professor, Department of Chemistry

5. COURSE PREAMBLE

Polymer science can be applied to save energy and improve renewable energy technologies. It include the conversion of natural and synthetic raw materials in to products that include plastic, rubber, etc.

6. DURATION

Total Duration: 30 Hrs. [Contact Hrs. 16 Hrs., Course Woks: 7 and Assessment Works: 7]

7. CURRICULUM FOCUS

Enhance the employability of the learners through curriculum enrichment for additional skill development.



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8. COURSE OBJECTIVES

Learners are expected to

- (a) Learn on how wastes are utilized for recovery of value.
- (b) Learn on processing and utilization of biomass for recovery of energy and other valuable products.

9. SKILL EXPECTED

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

- (a) Do different biological conversion methods.
- (b) Do the various waste processing techniques.

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	Understand the basics of biomass.	Understand
CO2	Analyze the different biological conversion methods.	Analyse
CO3	Examine the other Conversion methods..	Examine
CO4	Evaluate the various waste processing techniques.	Evaluate



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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	3	0	2	2	0	0	1	0	1	1	3	0	1	0	3
CO2	1	1	2	2	1	0	2	1	1	2	1	0	2	0	3
CO3	2	1	2	0	2	2	1	2	1	2	1	0	2	1	2
CO4	2	1	3	1	2	2	1	2	1	2	1	0	2	1	2
AVG	2.0	0.8	2.3	1.3	1.3	1.0	1.3	1.3	1.0	1.8	1.5	0.0	1.8	0.5	2.5

12. MODULE-WISE COURSE CONTENTS

MODULE 1: CONVERSION METHODS OF WASTES

MODULE DURATION: 15 Hrs. [Contact Hrs. 8 Hrs., Course Woks: 3 and Assessment Works: 4]

MODULE CONTENT: Biomass and solid wastes, Broad classification, Sources of Bio mass, Production of biomass, biomass yield comparison, photosynthesis, world scenario, Environmental effects. Biological conversion- Biodegradation and biodegradability of substrate - Biochemistry and process parameters of biomethanation – Bio-methanation Process - Bioconversion of substrates into alcohol -Methanol & ethanol Production - Organic acids – Solvents - Amino acids - Antibiotics etc., agro chemical conversion. Thermo chemical conversion of biomass, conversion to solid, liquid and gaseous fuels, pyrolysis, gasification, combustion, Enzymatic Fermentation, Gas/liquid Fermentation, Acid hydrolysis and hydrogenation.

MODULE OUTCOME: Understand the basics of biomass. Analyse the different biological conversion methods. Examine the other Conversion methods



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MODULE 2: WASTE PROCESSING

MODULE DURATION: 15 Hrs. [Contact Hrs. 8 Hrs., Course Woks: 4 and Assessment Works: 3]

MODULE CONTENT: Separation of components of solid wastes, handling and processing techniques, composting technique, recycling, Agro and forestry residues utilization through conversion routes, Use of biodegradable waste.

MODULE OUTCOME: Evaluate the various waste processing techniques.

REFERENCES

1. S. Samir, R. Zaborsky, *Biomass Conversion Processes for Energy and Fuels*, New York, Plenum Press, 1981.
2. H. D. Joseph, P. Joseph, H. John, *Solid Waste Management*, New York, Van Nostrand, 1973.
3. Jianzhong Sun et al. *Biological Conversion of Biomass for Fuels and Chemicals: Explorations from Natural Utilization Systems (Energy and Environment Series)*, RSC Publishing, 2013.

ADDITIONAL REFERENCES & STUDY MATERIALS

4. G. Tchobanoglous, H. Theisen, S. V. Tchobanoglous, G. Theisen, H. V. Samuel, *Integrated Solid Waste management: Engineering Principles and Management Issues*, New York, McGraw Hill, 1993.

13. DELIVERY MODE

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

14. DELIVERY SCHEDULE

June to September.



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15. DETAILED COURSE DELIVERY PLAN

Hour	Delivery Mode and Activity	Topics to be Covered
1	Contact Hour - 1: online Discussion	Introducing the Course
2	Contact Hour - 2: Oline Interaction	Biomass and solid wastes, Broad classification Sources of Bio mass, Production of biomass,
3	Assessment Hour – 1	Quiz using Kahoot
4	Contact Hour - 3: Online Lecture	Environmental effects. Biological conversion- Biodegradation and biodegradability of substrate -
5	Contact Hour - 4: Oline Lecture	Biochemistry and process parameters of biomethanation –
6	Course Work – 1:	Organic acids – Solvents - Amino acids - Antibiotics
7	Assessment Hour – 2	Quiz competition by making teams
8	Contact Hour - 5: Online Discussion	Thermo chemical conversion of biomass, pyrolysis, gasification, combustion,
9	Contact Hour - 6: Online Demonstration	Enzymatic Fermentation, Gas/liquid Fermentation,
10	Assessment Hour – 3	Q & A session (Oral)
11	Contact Hour - 7: Online Demonstration	Acid hydrolysis and hydrogenation.
12	Course Work – 2:	Google form quiz on different biological conversion methods.
13	Contact Hour - 8: Online Discussion	Separation of components of solid wastes



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Hour	Delivery Mode and Activity	Topics to be Covered
14	Course Work – 3:	Cross word Play
15	Assessment Hour - 4	Test Paper on Module 1
16	Contact Hour - 9: Online Demonstration	handling and processing techniques, composting technique, recycling techniques
17	Contact Hour - 10: Online Demonstration	Agro and forestry residues utilization through conversion routes,
18	Course Work – 4:	Q &A (Oral)
19	Contact Hour - 11: Online Discussion	Uses of biodegradable waste
20	Online live class Hour - 12: Online Lecture	conversion to solid, liquid and gaseous fuels,
21	Course Work – 5	Quiz on Kahoot
22	Online live class - 13: Online Lecture	Bio methanation Process -
23	Assessment Hour - 5	Quiz using google form
24	Online live class - 14: Online Discussion	Bioconversion of substrates into alcohol - Methanol & ethanol Production -
25	Course Work – 6:	Assignment on handling and processing techniques
26	Course Work – 7:	Test paper on Module 2
27	Online live class Hour - 15: online Interaction	Sum up of Module 1 & 2
28	Online live class Hour - 16: online Interaction	Sum up of Module 1 & 2
29	Assessment Hour - 6	Course End Assessment



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Hour	Delivery Mode and Activity	Topics to be Covered
30	Assessment Hour - 7	Course End Assessment

16. ASSESSMENT COMPONENTS

Total Marks: 100

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



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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
Absent	Ab	Absent	Fail

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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