



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
CERCH001: THERMAL ANALYSIS

OFFERED DURING THE
ACADEMIC YEAR 2016-17
[APPROVED BY ACADEMIC COMMITTEE, MAMO COLLEGE]



MANASSERY, MUKKAM POST,
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DEPARTMENT OF CHEMISTRY

CURRICULUM FOR CERTIFICATE COURSE IN THERMAL ANALYSIS [CERCH001]

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INSTITUTIONAL VISION, MISSION & OBJECTIVES 01



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



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: 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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ANALYSIS [CERCH001]

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.



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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.



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



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

CERCH001: THERMAL ANALYSIS 06

COURSE CURRICULUM

Course Name	Certificate Course in Thermal Analysis
Course Code	CERCH001
Year	2016-17
Course Designer	Mr. Farvees D
Course Duration	30 Hrs
Course Schedule	November to February
Maximum Students Intake	60 Students



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1. COURSE LEVEL

Foundational, skill-oriented certificate programme.

2. PREREQUISITE

Basic knowledge about principles of thermal equipment.

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.. Farvees.D, Assistant Professor, Department of Chemistry

5. COURSE PREAMBLE

Thermal analysis is a branch of material science where the properties of materials are studied as they change with temperature. Several methods are commonly used – these are distinguished from one another by the property, which is measured: Dielectric thermal analysis, dielectric permittivity and loss factor.

6. DURATION

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



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7. CURRICULUM FOCUS

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

8. COURSE OBJECTIVES

Learners are expected to

- Obtaining basic knowledge on thermo analytical methods.
- Combined methods of thermal analysis.
- Thermal methods in qualitative and quantitative analysis and in material science.
- Application of thermos analytical instruments in practice.
- Principles of selecting the experimental conditions.

9. SKILL EXPECTED

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

- Develop skills in handling the instruments
- The interpretation of experimental results.

10. COURSE OUTCOMES

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



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CO No	Course Outcome(CO)	Skill/Knowledge Attainment Level Based on Revised Bloom's Taxonomy
CO1	Understand the principles of thermo analytical techniques;	Understand
CO2	Apply thermo analytical methods	Apply
CO3	Take into account factors, which have effect on thermal measurements	Evaluate
CO4	Choose the experimental conditions for the measurements, analyse and present the results of the measurements case.	Analyze

11. MAPPING OF COs WITH PSO_s AND PO_s

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	0	0	1	3	1	2	1	2	3	0	0	3	1
CO2	1	2	0	1	1	2	1	3	0	2	2	0	1	3	1
CO3	3	2	0	1	1	2	1	2	1	2	3	0	2	3	1
CO4	3	2	0	1	1	2	1	2	0	3	2	0	1	3	1
AVG	2.0	1.8	0.0	0.8	1.0	2.3	1.0	2.3	0.5	2.3	2.5	0.0	1.0	3.0	1.0



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12. MODULE-WISE COURSE CONTENTS

MODULE 1: INSTRUMENTATION TECHNIQUES I

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

MODULE CONTENT: The effect of temperature change on the properties of the sample. Application of different thermo analytical techniques: thermo gravimetry (TG), derivative thermo gravimetry (DTG), differential thermal analysis (DTA),

MODULE OUTCOME: Understand the principles of thermos analytical techniques; take into account factors, which have effect on thermal measurements, apply thermos analytical methods, choose the experimental conditions for the measurements, combine different thermos analytical techniques, analyse and present the results of the measurements

MODULE 2: INSTRUMENTATION TECHNIQUES II

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

MODULE CONTENT Differential scanning calorimetry (DSC), thermomechanical and dynamic mechanical analysis (TMA and DMA), simultaneous techniques of thermal analysis and evolved gas analysis (EGA). Mechanism and kinetics of thermal decomposition.

MODULE OUTCOME: Obtaining basic knowledge on thermo analytical methods. - Combined methods of thermal analysis. - Thermal methods in qualitative and quantitative analysis and in materials science.



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REFERENCES:

1. Anderson, H.C. et al., *Thermal Analysis*, Marcel Dekker, NY 1966.
2. Brown, M.E., *Introduction to Thermal Analysis: Techniques and Applications*, Chapman & Hall, NY, 1988.
3. Charsley, E.L. & Warrington, S.B. ed., *Thermal Analysis: Techniques and Application*, Royal Society of Chemistry, UK, 1992.
4. Daniels, T.C., *Thermal Analysis*, John Wiley & Sons, NY, 1973.
5. Ferry, J.D., *Viscoelastic Properties of Polymers*, John Wiley & Sons, NY, 1980.
6. Garn, P.D., *Thermo Analytical Methods of Investigation*, Academic Press, NY, 1965.
7. Haines, P.J. et al., *Thermal Methods of Analysis: Principles, Applications and Problems*, Blackie Academic and Professional, England, 1995

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



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Hour	Delivery Mode and Activity	Topics to be Covered
2	Contact Hour – 2: Classroom Interaction	Introduce different types of properties of samples
3	Contact Hour - 3: Classroom Lecture	The effect of temperature change on the properties of the sample
4	Contact Hour - 4: Classroom Discussion	Application of different thermo analytical techniques
5	Assessment Hour-1	Quiz competition by making teams
6	Course Work – 1: Course Assignment	Assignment on different properties of samples
7	Contact Hour - 5: Classroom Lecture	Thermo gravimetry (TG)
8	Contact Hour - 6: Classroom Interaction	Derivative thermo gravimetry (DTG)
9	Course Work – 2: Course Assignment	Course Assignment to draw the thermo analytical techniques
10	Contact Hour - 7: Classroom Discussion	Differential thermal analysis (DTA)
11	Assessment Hour – 2	Assignment to analyse difference between TG, DTG and DTA
12	Course Work – 3: Course Assignment	Course Assignment on the diagrams of DTA and DTG
13	Assessment Hour – 3	Test paper on Module-1
14	Contact Hour - 8: Classroom Lecture	Differential scanning calorimetry (DSC)
15	Contact Hour - 9: Classroom Demonstration	Thermo mechanical analysis (TMA)



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Hour	Delivery Mode and Activity	Topics to be Covered
16	Contact Hour - 10: Classroom Lecture	Dynamic mechanical analysis (DMA)
17	Assessment Hour – 4	Assignment to analyse difference between TMA and DMA
18	Contact Hour - 11: Classroom Lecture	Thermal analysis
19	Course Work – 4: Course Assignment	Course Assignment on the application of TMA
20	Course Work – 5: Course Assignment	Course Assignment on the application of DMA
21	Assessment Hour – 5	Quiz competition by making teams
22	Contact Hour - 12: Classroom Lecture	Evolved gas analysis (EGA)
23	Contact Hour - 13: Classroom Lecture	Simultaneous techniques of thermal analysis and evolved gas analysis (EGA)
24	Contact Hour - 14: Classroom Interaction	Mechanism of thermal decomposition.
25	Contact Hour - 15: Classroom Lecture	Kinetics of thermal decomposition.
26	Course Work – 6: Course Assignment	Course Assignment on the application of EGA
27	Contact Hour - 16: Classroom Interaction	Sum up of Module I and Module II
28	Course Work – 7: Course Assignment	Course Assignment on different types of thermo analytical methods
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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Percentage of Mark	Letter Grade	Interpretation	Class
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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