



Water Quality Monitoring

Value Added Course 2021-22

Department of Chemistry



Course Description

This course enables the student to analyze the various physical, chemical and biological parameters of both ground water and surface water as per the standard procedure put forward by WHO

Course Objectives


- To create awareness about safe laboratory practices
- To provide hands on experience on water quality checking instruments
- To impart theoretical and practical skills on ground and surface water analysis



VALUE ADDED COURSE(2021-22) -ATTENDANCE SHEET


Department of Chemistry, CMS College, Kottayam

SL.NO	UPRN	NAME	6-11-22	7-11-22	8-11-22	9-11-22	10-11-22	11-11-22	12-11-22	13-11-22	14-11-22	15-11-22	16-11-22	17-11-22	18-11-22	19-11-22	20-11-22	21-11-22	22-11-22
1	201108101	AKSHARA S	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	201108102	ALAN SEBASTIAN THOMAS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	201108103	ANN MIRIAM ABRAHAM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	201108104	ASHTAMI B P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	201108105	ASWIN K	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	201108106	BINUJA VARGHESE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	201108107	DIVYA U	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	201108108	GAUTHAM KRISHNA K	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	201108109	GAYATHRI M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10	201108110	GOPIKA KRISHNA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
11	201108111	GOUTHAM RAJ M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12	201108112	KRISHNA PRASAD K V	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
13	201108113	LINUMOL K SABU	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
14	201108114	MEERA VIJAYAN	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
15	201108115	NANDU KRISHNA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16	201108116	NEHA ELSA BINOY	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
17	201108117	PARVATHY P S	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
18	201108118	SANDRA ANNA GEORGE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓


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19	201108120	SHAUN VARGHESE SHIBU	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
20	201108121	SHIRIN M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
21	201108122	SNEHA ANNA THOMAS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
22	201108123	SNEHA STANLEY	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	201108124	SUJITH P S	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24	201108125	ABIN GEO RAJU	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
25	201108126	AISWARYA B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
26	201108127	AKSA RACHEL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
27	201108128	AKZA NAZAR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
28	201108129	AMALA JOSE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
29	201108130	ASHLY ANGEL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
30	201108131	CHRISTIN PHILIP GEORGE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
31	201108132	DEVAPRAYAG K B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
32	201108133	DEVIKA SANTHOSH	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
33	201108135	HARITHADAS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
34	201108136	HELENA ELIZABETH SEN	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
35	201108137	JAYANTH JOHN JACOB	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
36	201108138	JINCY P JAMES	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
37	201108139	JOHN B KOTTOORAN	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
38	201108140	JOJINI KJ	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
39	201108142	LIZA RACHEL JOHNSON	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
40	201108143	MOHAMMED SIBIL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
41	201108144	NAYANTHARA S	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓


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42	201108145	NIJI MARY CHACKO	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
43	201108146	NIKHILA RAJU	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
44	201108147	SARA SUNNY	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
45	201108149	SREELAKSHMI V	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
46	201108150	SUSANNA REJI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓


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COURSE I: LEVEL I

Course	Details				
Code	CCCH01				
Title	Water quality monitoring				
Offered to	UG Students				
Branch	Chemistry				
Duration	Six Months				
Type	Certificate Course				
Credits	2	Hrs/Week	2	Total Hours	36

COURSE DESCRIPTION

This course enables the student to analyze the various physical, biological and chemical parameters of both ground and surface water as per the standard procedure put forward by World Health Organization.

COURSE OBJECTIVES

1. To create awareness about safe laboratory practices
2. To provide hands on experience on instruments like pH meter, conductivity meter, potentiometer, colorimeter, micropipette, centrifuge etc.
3. To impart theoretical knowledge and practical skills on analysis of ground and surface water

COURSE OUTCOMES

CO No.	<i>Expected Course Outcomes</i>	Cognitive Level
	<i>Upon completion of this course, the students will be able to:</i>	
1	Manage issues related to lab safety	Ap
2	Understand the principle and theory behind various analytical	U

	methods	
3	Determine the authenticity of a physical parameters	Ap
4	Analyze real samples like water samples and food samples for finding adulteration	An

CONTENT: THEORY (18 Hours; Credit 1)

Module	Course Description	Hrs	CO.No.
1.0	Lab Safety	3	1,2
1.1	Laboratory hygiene and safety- storage and handling of chemicals.	1	1,2
1.2	Laboratory signs- Simple first aids: electric shocks, fire, cut glass, inhalation of poisonous gases, accidents due to acids and alkalies, burns due to phenol and bromine.	1	1,2
1.3	Disposal of sodium and broken mercury thermometer. Awareness of material safety data sheet (MSDS). Disposal of used chemicals, Good Laboratory Practices.	1	1,2
2.0	Sampling and Data Analysis	2	2, 3,4
2.1	Sampling, evaluation of analytical data, errors, accuracy and precision, methods of their expression, indeterminate errors.	1	2,3
	Various methods for the representation of data.	1	
3.0	Techniques and Instruments used in Chemical Analysis	2	2, 3,4
3.1	Titrimetric and electroanalytical techniques used for water analysis. Introduction to the usage of micropipettes, centrifuge, pH meter, colorimeter etc.	1	2, 3,4
4.0	Introduction to surface and ground water	5	
4.1	Hydrological cycle, quality of surface and ground water.	1	
4.2	Biology of natural water- plant algae, microfonna , microbiology.	1	
4.3	Sources of contamination; Industry, Agriculture and household. Processes in nature and human activities in contaminating water. Pollution of fresh water, ground water and ocean. Effects of water pollution from various agents such as pesticides, detergents and inorganic pollutants.	1	
4.4	Waste water treatment techniques: Activated sludge process, Aerated	2	

	lagoons, trickling filters, up flow anaerobic sludge blanket, disinfection, sludge treatment, tertiary and advanced waste water treatment-Industrial waste water treatment. Activated Carbon Adsorption (filtration by activated charcoal). Treatment with ion exchange resins, membrane techniques.		
5.0	Water quality parameters and standards	6	2,3,4
5.1	Classification of physical, chemical and biological parameters of water; Procedure for sample collection for various analysis. Significance of water quality parameters. Water quality standards- drinking, industrial, Irrigation	2	2,3,4
5.2	Measurement of water quality parameters: Odour, Colour, Electrical conductivity, Turbidity, Total dissolved solids (TDS), Salinity, Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), Dissolved oxygen (DO), Total microbes, pH, acidity, alkalinity, Hardness, Chloride content, iron content and total ammonia.	4	2,3,4

CONTENT: PRACTICAL (18 Hours; Credit 1)

Module	Course Description	Hrs	CO.No.
1.0	Sample collection for various analysis	2	4, 5
2.0	Determination Organoleptic & Physical Parameters: Colour, odour, pH, taste, turbidity and total dissolved solids.		
3.0	Determination of chemical parameters of water		
4.0	Determination of biological parameters of water		
5.0	Standard representations of a data by Origin/Microsoft Excel	2	4
6.0	Taking anthropogenic investigation of at least 2km of a stream or river on one side.		
7.0	Case study: Kuttanadu wetland		

References

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
2. Willard, H.H. Et al.: Instrumental Methods of Analysis, 7th Ed. Wardsworth Publishing Company, Belmont, California, USA, 1988.
3. Christian, G.D. Analytical Chemistry, 6th Ed. John Wiley & Sons, New York, 2004.
4. Harris, D.C.: Exploring Chemical Analysis, 9th Ed. New York, W.H. Freeman, 2016.
5. Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age International Publisher, 2009.
6. Skoog, D.A. Holler F.J. & Nieman, T.A. Principles of Instrumental Analysis, Cengage Learning India Ed.

7. Mikes, O. Laboratory Hand Book of Chromatographic & Allied Methods, Elles Harwood Series on Analytical Chemistry, John Wiley & Sons, 1979.
8. Ditts, R.V. Analytical Chemistry; Methods of separation, van Nostrand, 1974.

Teaching Methodologies

- Class room learning through Power point presentation, smart classes, demonstrations etc.
- Outreach programme Based learning
- Peer Teaching
- Demonstration Methods for lab practices.
- Learning through Student Centric methods like Group discussions, Debate, Quiz etc.

Methods of Evaluation

75 % attendance is mandatory for appearing in any examinations. One industrial visit and Outreach programme is compulsory awarding the certificate in the mentioned course. For theory and practical a minimum of 40% marks is mandatory for the award of the certificate.

Sl.No.	Type	Marks
1.	Attendance	5
2.	Assignment/Viva/Seminar	10
3.	Written Test (Theory)	100
4.	Practical Test	100
5.	Institution Visit and Report Submission	50
6.	Outreach Programme	20
7.	Record	15
Total		300

Mark distribution of Attendance

Percentage	Mark
Above 90 %	5
Above 85%	4
Above 80%	3
Above 75%	2
75%	1
Below 75%	0

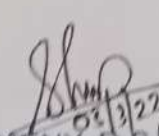
Report on the value added Programme

“Water Quality Monitoring”

Offered by Department of Chemistry, CMS College, Kottayam

The Department of chemistry, CMS College Kottayam conducted an Add on Course on “water quality monitoring” from 10th January 2022 to 28th February 2022. This course enabled the students to analyse the various physical, biological and chemical parameters of both ground and surface water as per the standard procedure put forward by World Health Organization. An awareness on water pollution prevention and remediation programs were also conducted. Students have developed important safe laboratory practices. This course provided hands on experience on instruments like pH meter, conductivity meter, potentiometer, colorimeter, micropipette, centrifuge etc. This course impart theoretical knowledge and practical skills on analysis of ground and surface water.

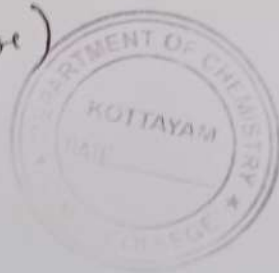
A total of 46 students successfully completed the course which contains 18 hours of theory classes and 18 hours of practical sessions. Various sessions were conducted by resource persons from suitable fields which includes-Laboratory safety Measures, Sampling and data analysis, Introduction to Instrumental Chemical Analysis, Introduction to Surface and Ground Water and Water Quality Parameters and Standards.

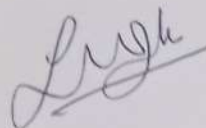

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(Signature)

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