

# VALUE ADDED COURSE 2022-2024

## Water quality Analysis and Analytical techniques



**CHRIST**  
COLLEGE (AUTONOMOUS)  
IRINJALAKUDA, KERALA

### COURSE STRUCTURE

**35 Hours (25 Hours Theory +  
10 Hours Practical)**

### COURSE FEE

**Rs.1000/-**

### COURSE DURATION

**October 2023- December 2023**

### ABOUT COLLEGE

Christ College was started in the year 1956 by the Devamatha province of the Carmelites of Mary Immaculate (CMI), an Indigenous Religious Congregation. founded in 1831, by St. Cyriac Elias Chavara, a saintly priest and versatile genius, who envisioned education as a tool for liberation and development. Christ College has been affiliated to Calicut University and re accredited by NAAC with the highest grade 'A'. Christ College is dedicated to Christ and has the Motto " Jeevith Prabha which means "Light of Life". Christ College is part of a century old tradition of CMI education that is at its heart, Christian and specifically Catholic. It offers an ideal vision of education that is aware of and responsive to the challenges of the nation's present situation.

### DEPARTMENT OF BOTANY

The MSc Botany Programme was started in 2013 as a self-financing basis in the affiliation of university of Calicut. The department offers MSc Botany with "Environmental biology and biodiversity conservation "and "Genetic engineering as special papers which is in affiliation with University of Calicut. The Department has also implemented the Choice- based Credit System for grading M.Sc., which offers flexibility in the structuring and assessment of courses .The Department has Tissue Culture and Biochemistry labs that are well equipped with latest instruments. Projection facilities are also available in classrooms to facilitate student learning with visual representation of concepts discussed in class. The Department also maintains an enormous collection of museum and herbarium specimens. These collections facilitate in practical learning of the subject and in forming a connection with the specimens of nature they study

#### Course co-ordinator

Prof.EJ Vincent  
Dr. Subin K.Jose

#### Offered by

Department of Botany

#### Eligibility

Degree





## **COURSE OBJECTIVES:**

- To provide students an understanding of the expectations of industry.
- To improve employability skills of students.
- To bridge the skill gaps and make students industry ready.
- To provide an opportunity to students to develop inter-disciplinary skills.
- To mould students as job providers rather than job seekers.

## **COURSE OUTCOME:**

- To understand different environmental analysis tools
- To familiarize different analytical instruments
- To get technical expertise in water analysis



VALUE ADDED COURSE, CHRIST COLLEGE  
AUTONOMOUS IRINJALAKUDA

# **WATER QUALITY ANALYSIS AND ANALYTICAL TECHNIQUES - CPCC70 Assessment Procedure 2023-24**

Environmental science is a vast and increasingly important field. The design and implementation of policies to protect our health and environment rely on environmental analysis. In turn, environmental scientists require suitable analytical methods and techniques to monitor the effects of environmental contaminants. The course is designed to develop skills in analytical methods used for environmental analysis. The course includes analysis techniques for environmental monitoring of water. After a brief introduction to the general problem of pollution the course illustrates, above all through the discussion of specific examples, the criteria and methodologies to be followed for the solution of problems typical of environmental analysis.

**Which of the following is the light emitting property of waste water**

- (a) Turbidity
- (b) pH
- (c) Volatility
- (d) Alkalinity

**How can stability of radiation be achieved in incandescent or discharge sources used in Absorption Spectroscopy?**

- a) Using filters
- b) Using monochromators
- c) Using slits<sup>3</sup>
- d) By controlling the source voltage

**Aeration of water is done to remove \_\_\_\_\_**

- (a) Turbidity
- (b) Odour
- (c) Bacteria
- (d) Color

# **WATER QUALITY ANALYSIS AND ANALYTICAL TECHNIQUES -CPCC70**

## **Value Added Certificate Course**

### **Teacher Coordinator Report 2023-24**

Number of students	15
Date of examination	OCTOBER 3, 2023
Total students who passed exam	15
Total course duration	35 Hrs.

#### **Feedback analysis:**

- Students appreciated the techniques and their wonderful experiences of hands-on training.
- Students appreciated the advantage of the hands-on training session in future research purposes.
- The students enjoyed team work.
- 100% of the students enjoyed the classes.
- Students demanded more such courses to develop their practical skills.

**Course Coordinators: Dr. Subin K. Jose., HOD Dept. of Environmental Science and  
E. J. Vincent, Coordinator of Department of Botany**



**CHRIST COLLEGE (AUTONOMOUS) IRINJALAKUDA**  
**VALUE ADDED CERTIFICATE COURSE PRACTICAL EXAMINATION-2023**  
**WATER QUALITY ANALYSIS AND ANALYTICAL TECHNIQUES**

**TIME: 2 Hours**

**MAX. MARKS: 50**

**Answer all the questions.**

- |   |                    |
|---|--------------------|
| 1. Analyze the pH of the given sample.                    | <b>[1x20 = 20]</b> |
| 2. Analyze the hardness of the given sample.              | <b>[1x20 = 20]</b> |
| 3. Analyze the Calcium and Magnesium of the given sample. | <b>[1x10 = 20]</b> |

**TOTAL: 50 MARKS**

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**A REPORT ON VALUE ADDED COURSE**

**“WATER QUALITY ANALYSIS AND  
ANALYTICAL TECHNIQUES”**

**ORGANIZED BY**

**DEPARTMENT OF BOTANY**

**IN**

**COLLABORATION WITH**

**DEPARTMENT OF ENVIRONMENTAL SCIENCE**



## **COURSE DETAILS**

<b>Title of the Course</b>	<b>“Water Quality Analysis And Analytical techniques”</b>
<b>Course duration:</b>	<b>03-10-2023 to 04 -12-2023</b>
<b>Contact Hours</b>	<b>35 hrs.</b>
<b>No. of Students</b>	<b>15</b>
<b>No. of students who completed the course:</b>	<b>15</b>
<b>Course Coordinator:</b>	<b>Dr. Subin K. Jose. HOD Dept. Of Environmental Science</b>
<b>PG Botany Coordinator</b>	<b>Prof. E. J. Vincent</b>
<b>Course Fee:</b>	<b>1000/each student</b>

## **INTRODUCTION TO THE COURSE**

With the objective of enhancing the all round ability of students and raising their competence for the job market, the Department organizes Value-added courses for our Post graduate students. These courses are oriented towards developing graded skills and personalities beyond the regular curriculum of the Program.

### **OBJECTIVES:**

#### **The main objectives of the Value-Added Course are:**

- To provide students an understanding of the expectations of industry.
- To improve employability skills of students.
- To bridge the skill gaps and make students industry ready.
- To provide an opportunity to students to develop interdisciplinary skills.
- To mold students as job providers rather than job seekers.



# SYLLABUS

**Name of Value-added course: Water analysis and Analytical techniques**

**Syllabus hours: 35**

**Course outcome: To understand different environmental analysis tools**

**To familiarize different analytical instruments**

**To get technical expertise in water analysis**

## Syllabus details:

### **Module I:**

#### **Introduction to environmental analysis tools**

Gravimetric Methods- Principle and application of gravimetric methods in determination of total, dissolved, suspended, volatile and fixed solids present in water and waste water.

Volumetric Methods- Importance of volumetric analysis. - Standardization of reagents using volumetric titrations

Electrochemical Methods - pH meters, Glass and reference electrodes- Ion selective electrodes- Electrical conductivity measurements: Conductivity Meters

Photometric methods- Principle and applications of colorimetry, Nephelometry and Turbidometry- Spectrophotometry- Optical design of filter photometer, single beam spectrophotometer, double beam –UV – Visible – Spectrophotometer

### **Module II: Analytical Techniques and instrumentation- (Principles and application)**

Microscopy- Light microscope, Bright field, Dark field, Phase contrast and Fluorescent microscope.

**Module III:** Analysis of pH, conductivity, colour, temperature, turbidity, odour, acidity, alkalinity, Dissolved oxygen, BOD, Nitrate, Phosphate, Fluoride, Calcium, Magnesium, Hardness

**Module IV:** Basics of environmental issues, Solid waste management, Water pollution. Water pollution assessment. Waste water treatment techniques and methods.

## **Suggested Readings:**

1. Rump, H. H. and Krist, H. (1998), Laboratory Manual for the Water, Wastewater and Soil, VCH Publishers, New York.
2. Skoog, D. A. and Leary, J. J. (1992). Principles of Instrumental Analysis, 4th ed., Saunder's College Publishing, Fortworth.
3. Stanley, E. M. (2004), Environmental Chemistry, CRC Press
4. Bour, E. J. (1982), Introduction to Chemical Instrumentation, 4th edition, Wiley and Sons, NY.
5. Christian, G.D. (2001), Analytical Chemistry, 5th edition, John Wiley and Sons Inc., India
6. Khopkar, S.M. (1993), Environmental Pollution analysis, Wiley Eastern Ltd.
7. Manahan, S.E. (2007), Environmental Chemistry, 7th edition, Lewis Publications, Florida, USA.

8. Manly, (2001) *Statistics for Environmental Science and Management*, Chapman and Hall / CRC Press, Boca Raton, FL, USA. Peter Laake, Haakon Breien Benestad. Academic Press, 05-Nov-2007 -
9. Vogel, A.I. (1998), *Quantitative Analysis*, 6th edition, Prentice Hall Inc.,
10. Willard, H. H., Merritt L. L. and Dean, J. A. (1976), *Instrumental Methods of Analysis*, 5th edition, Van Nostrand Reinhold.

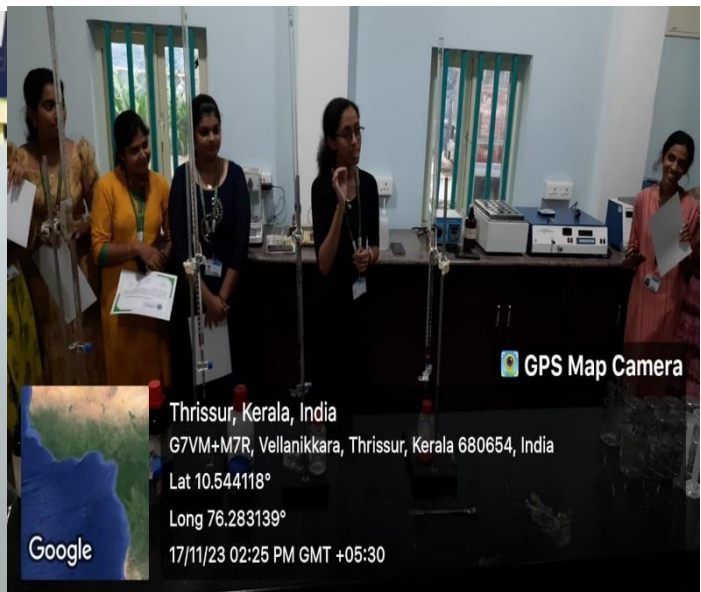


**II PG -2022 Admission**

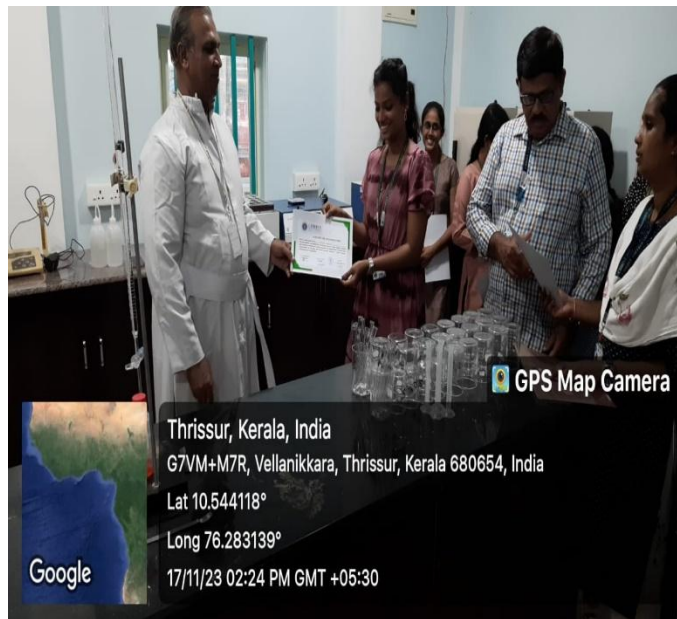
SI NO	NAME OF STUDENT	DATES ATTENDED THE COURSE													
		03/10/23		10/11/23		13/11/23		14/11/23		16/11/23		28/11/23		04/12/23	
		FN	AN	FN	AN	FN	AN	FN	AN	FN	AN	FN	AN	FN	AN
1	AGNUS ROSE	P	P	P	P	P	P	P	P	P	P	P	P	P	P
2	ANEENA MANUEL	P	P	P	P	P	P	P	P	P	P	P	P	P	P
3	ANGEL THOMAS	P	P	P	P	P	P	P	P	P	P	P	P	P	P
4	ATHEENA B S	P	P	P	P	P	P	P	P	P	P	P	P	P	P
5	HRIDHYA KRISHNAN	P	P	P	P	P	P	P	P	P	P	P	P	P	P
6	JOSNI C. J	P	P	P	P	P	P	P	P	P	P	P	P	P	P
7	LEEN BABU	P	P	P	P	P	P	P	P	P	P	P	P	P	P
8	MEBIN C M	P	P	P	P	P	P	P	P	P	P	P	P	P	P
9	MEEVAL ALPHONSA T PAULSON	P	P	P	P	P	P	P	P	P	P	P	P	P	P
10	MERIN THOMAS	P	P	P	P	P	P	P	P	P	P	P	P	P	P
11	POOJA	P	P	P	P	P	P	P	P	P	P	P	P	P	P
12	SALINI V S	P	P	P	P	P	P	P	P	P	P	P	P	P	P
13	SHAHANA SHAMSEER	P	P	P	P	P	P	P	P	P	P	P	P	P	P
14	SINTA E A	p	P	p	p	p	p	p	p	p	p	p	p	p	p
15	VISMAYA P M	P	P	P	P	P	P	P	P	P	P	P	P	P	P

Course coordinator: Dr. Subin K. Jose

PG Botany Coordinator: Prof. E. J. Vincent







## CERTIFICATE





**CHRIST COLLEGE (AUTONOMOUS), IRINJALAKUDA  
VALUE ADDED CERTIFICATE COURSE**

**WATER QUALITY ANALYSIS AND ANALYTICAL TECHNIQUES**

**M. Sc. BOTANY 2022 ADMISSION**

<b>Name of the Candidate</b>	<b>Reg. No.</b>
AGNUS ROSE	CCAWMBT001
ANEENA MANUEL	CCAWMBT002
ANGEL THOMAS	CCAWMBT003
ATHEENA B S	CCAWMBT004
HRIDHYA KRISHNAN	CCAWMBT005
JOSNI.C. J	CCAWMBT006
LEEN BABU	CCAWMBT007
MEBIN C M	CCAWMBT008
MEEVAL ALPHONSA T PAULSON	CCAWMBT009
MERIN THOMAS	CCAWMBT010
POOJA	CCAWMBT011
SALINI V S	CCAWMBT012
SHAHANA SHAMSEER	CCAWMBT013
SINTA E A	CCAWMBT014
VISMAYA P.M	CCAWMBT015





# **WATER QUALITY ANALYSIS AND ANALYTICAL TECHNIQUES**

## **Value Added Certificate Course**

### **Summary Report 2023**

The course started on October 03, 2023. There were 15 students and 15 students completed the course. The course was 35 Hrs. duration. Students enjoyed the group dynamics and, in their feedback, requested for more such sessions in the future.

#### **Course Outcome:**

The students were satisfied with the class. They were given different aspects of Analytical Techniques and Instrumentation in Biology. This helped them understand different environmental analysis tools, familiarize different analytical instruments and to get technical expertise in water analysis

**Course Coordinator: Dr. Subin K. Jose., HOD Dept. of Environmental Science and  
E. J. Vincent, Co-Ordinator of Department of Botany**




**CHRIST**  
COLLEGE (AUTONOMOUS)  
IRINJALAKUDA, KERALA

### CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. SHAHANA SHAMSEER  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
Department of Geology and Environmental Science , Christ College  
(Autonomous), Irinjalakuda.

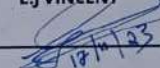
COURSE COORDINATOR

Dr. SUBIN K JOSE

  
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COURSE IN CHARGE


E.J VINCENT

  
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PRINCIPAL

Dr. Fr. Jolly Andrews CMI

  
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


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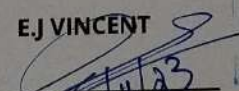
## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. VISMAYA P.M  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
Department of Geology and Environmental Science , Christ College  
(Autonomous), Irinjalakuda.

COURSE COORDINATOR  
Dr. SUBIN K JOSE

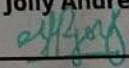
  
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COURSE IN CHARGE  
E.J VINCENT

  
17/11/23  
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PRINCIPAL  
Dr. Fr. Jolly Andrews CMI

  
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
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IRINJALAKUDA, KERALA

## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. MEEVAL ALPHONSA T PAULSON  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
Department of Geology and Environmental Science , Christ College  
(Autonomous), Irinjalakuda.


COURSE COORDINATOR

Dr. SUBIN K JOSE

  
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COURSE IN CHARGE


E.J VINCENT

  
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PRINCIPAL

Dr. Fr. Jolly Andrews CMI

  
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COLLEGE (AUTONOMOUS)  
IRINJALAKUDA, KERALA

## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. POOJA  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
Department of Geology and Environmental Science , Christ College  
(Autonomous), Irinjalakuda.

COURSE COORDINATOR

Dr. SUBIN K JOSE

COURSE IN CHARGE

EJ VINCENT

  
12/11/23

PRINCIPAL

Dr. Fr. Jolly Andrews CMI




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COLLEGE (AUTONOMOUS)  
IRINJALAKUDA, KERALA

## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. LEEN BABU  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
Department of Geology and Environmental Science , Christ College  
(Autonomous), Irinjalakuda.

COURSE COORDINATOR

Dr. SUBIN K JOSE

  
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COURSE IN CHARGE

E.J VINCENT

  
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PRINCIPAL

Dr. Fr. Jolly Andrews CMI

  
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
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COLLEGE (AUTONOMOUS)  
IRINJALAKUDA, KERALA

## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. JOSNI C.J  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
Department of Geology and Environmental Science , Christ College  
(Autonomous), Irinjalakuda.

COURSE COORDINATOR

Dr. SUBIN K JOSE

  
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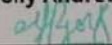
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PRINCIPAL

Dr. Fr. Jolly Andrews CMI

  
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**CHRIST**  
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IRINJALAKUDA, KERALA

## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. ATHEENA B.S.  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
Department of Geology and Environmental Science , Christ College  
(Autonomous), Irinjalakuda.

COURSE COORDINATOR

Dr. SUBIN K JOSE

COURSE IN CHARGE

E.J VINCENT

  
17/4/23

PRINCIPAL

Dr. Fr. Jolly Andrews CMI



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## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. ANGEL THOMAS  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
Department of Geology and Environmental Science , Christ College  
(Autonomous), Irinjalakuda.

COURSE COORDINATOR

Dr. SUBIN K JOSE

COURSE IN CHARGE

E.J VINCENT

  
17/11/23

PRINCIPAL

Dr. Fr. Jolly Andrews CMI





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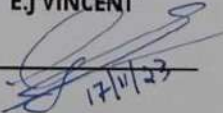
## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. MERIN THOMAS  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
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COURSE COORDINATOR  
Dr. SUBIN K JOSE

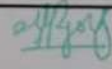
  
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COURSE IN CHARGE  
E.J VINCENT

  
\_\_\_\_\_ 17/11/23



PRINCIPAL  
Dr. Fr. Jolly Andrews CMI

  
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COLLEGE (AUTONOMOUS)  
IRINJALAKUDA, KERALA

## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. HRIDHYA KRISHNAN  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
Department of Geology and Environmental Science , Christ College  
(Autonomous), Irinjalakuda.

COURSE COORDINATOR

Dr. SUBIN K JOSE

  
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E.J VINCENT

  
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PRINCIPAL

Dr. Fr. Jolly Andrews CMI

  
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
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IRINJALAKUDA, KERALA

## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. SALINI V.S.  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
Department of Geology and Environmental Science , Christ College  
(Autonomous), Irinjalakuda.


COURSE COORDINATOR

Dr. SUBIN K JOSE

  
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COURSE IN CHARGE

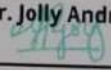
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PRINCIPAL

Dr. Fr. Jolly Andrews CMI

  
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


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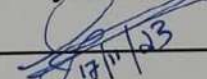
## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. ANEENA MANUEL  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
Department of Geology and Environmental Science , Christ College  
(Autonomous), Irinjalakuda.

COURSE COORDINATOR  
Dr. SUBIN K JOSE

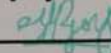
  
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COURSE IN CHARGE  
E.J VINCENT

  
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PRINCIPAL  
Dr. Fr. Jolly Andrews CMI

  
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**CHRIST**  
COLLEGE (AUTONOMOUS)  
IRINJALAKUDA, KERALA

## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. AGNUS ROSE  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
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COURSE COORDINATOR  
Dr. SUBIN K JOSE

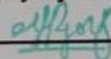
  
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COURSE IN CHARGE  
EJ VINCENT

  
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PRINCIPAL  
Dr. Fr. Jolly Andrews CMI

  
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**CHRIST**  
COLLEGE (AUTONOMOUS)  
IRINJALAKUDA, KERALA

## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. MEBIN C.M.  
has successfully completed the certificate course in Water quality Analysis  
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(Autonomous), Irinjalakuda.

COURSE COORDINATOR

Dr. SUBIN K JOSE

  
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COURSE IN CHARGE

E.J VINCENT

  
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PRINCIPAL

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IRINJALAKUDA, KERALA

## CERTIFICATE OF COMPLETION

This to certify that Mr./Ms. SINTA E.A  
has successfully completed the certificate course in Water quality Analysis  
and Analytical techniques, Jointly organized by Department of Botany and  
Department of Geology and Environmental Science , Christ College  
(Autonomous), Irinjalakuda.

COURSE COORDINATOR

Dr. SUBIN K JOSE

  
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COURSE IN CHARGE

EJ VINCENT

  
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PRINCIPAL

Dr. Fr. Jolly Andrews CMI

  
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