



Event Report

Certificate Course on **ENVIRONMENTAL HEALTH AND SUSTAINABILITY**

11 - 13 March 2025



Centre for Research in Environment, Sustainability Advocacy and Climate
Change (REACH), Directorate of Research,
SRM Institute of Science and Technology
Kattankulathur, Tamil Nadu, India

"A BETTER ENVIRONMENT- A BETTER TOMORROW- SAVE THE PLANET"





SRM
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University Act of 1986, Act. 1986)



CERTIFICATE COURSE ON



**Environmental health
& Sustainability**

11- 13 MARCH 2025

Organized by
Centre for Research in Environment, Sustainability Advocacy and Climate CHange (REACH)
Directorate of Research, SRMIST

Expert Lectures/ Hands-on Sessions
by



Dr. Daniel D. Snow
Research Professor and Director Water Sciences
Laboratory University of Nebraska-Lincoln, USA



Dr. Natsuko Kajiwara
Senior Scientist, Material Cycles Division
National Institute for Environmental Studies, Japan



Dr. Pankaj Kumar
National Project Coordinator,
UNIDO, New Delhi, India



Dr. Paromita Chakraborty
REACH, Directorate of Research,
SRMIST, Chennai, India

Important topics

- # Microcontaminants in Air, Soil and Water
- # Monitoring techniques
- # Risk Assessment
- # Need for Sustainable Technologies

Registration Fee: INR. 300
FOR REGISTRATION



Date : 11.03.2025 - 13.03.2025
Venue : Sir C. V. Raman Research Park



NAAC
Category I
AACSB Status



NIRF
2024
20th Ranked University



NIRF
2024
11th Rank - Institutions



QS
2024
World Ranking
Improving 10 Indian Universities



THE
2024
World Ranking
Improving 10 Indian Universities



CS
2024
20th Ranked University



CS
2024
20th Ranked University



UNESCO
2024
World Ranking
Ranked 3rd in India Universities

“BE ECO-FRIENDLY SAVE THE ENVIRONMENT”

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Certificate Course on Environmental Health and Sustainability

Certificate Course Team members

Subject Experts



Dr. Natsuko Kajiwara, Senior Scientist at the National Institute for Environmental Studies, Japan has profound research expertise in studies related to the presence of Additive Chemicals contained in flame-retardant products and Recycled Plastic products. She has a Ph.D in Chemistry and has commanding research skills in the fields of Measurement, Testing, and Evaluation of hazardous and valuable substances in material cycles and Assessment of chemical additives in plastic recycling to enhance chemical management in a circular economy.



Dr. Daniel D. Snow, Research Professor and Director of Water Sciences Laboratory, in the University of Nebraska-Lincoln, USA is an expert in the field of Analytical Chemistry, he is a Pioneer researcher and has prominently been involved in creating analytical methods for the detection of developing new and emerging environmental contaminants. He leads in the building of new methodologies to measure and use stable and radioactive isotopes as tracers for studying environmental problems and processes.



Dr. Paromita Chakraborty, Professor and Head Centre for Research in Environment, Sustainability Advocacy and Climate Change (REACH), is Ph.D in Natural Sciences has research contributions in the fields of Atmospheric studies, Riverine and marine ecosystems, Wastewater based epidemiology, Health risk assessment, and Waste to wealth. She has deep expertise in studies based on multi-media movement of organic pollutants, Long-range atmospheric transport of persistent organic pollutants, Quantification and ecological impact assessment of plasticizers in the riverine and marine environments, Development of cost-effective remediation techniques for emerging organic contaminants and Fabrication of new products from recycled and waste plastic.



Dr. Pankaj Kumar, National Project Coordinator in the United Nations Industrial Development Organization (UNIDO), as a Technical Cum Project Management expert, Dr. Pankaj Kumar's contributions span across Technical expertise, Project management and Monitoring, capacity building/training, and Policy advisory across a wide range of solar energy, chemicals, and energy-efficiency initiatives. He has significantly advanced the energy field through pioneering technical setups, extensive feasibility studies, development of financial models, rigorous training efforts, and involvement with subsidy structuring and project evaluation, which reflects his deep engagement with policy frameworks and implementation strategies in the industrial sector.



Program Coordinators



Dr. B. Neppolian
Dean Research
SRMIST Kattankulathur



Dr. Paromita Chakraborty
Head REACH, Directorate of Research, SRMIST,
Kattankulathur

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Program Co-coordinators



Dr. Debasmita Bandyopadhyay
Scientist, REACH SRMIST



Dr. Vanthana Sree G
Scientist, REACH SRMIST



Dr. Ankita Rani
Scientist, REACH SRMIST

Lab Assistants



Mr. Augustine Crispin C., Research associate working under the mentorship of Dr. Paromita Chakraborty. Mr. Augustin's research work focuses on detection and Quantification of microplastics.



Ms. Pavithra K. SRMIST Seniors Research Fellow (SRF), is registered with Dept. of Civil Engineering and works under the supervision of Dr. Paromita Chakraborty on the research topic "Occurrence and Adsorbent based removal of Polyfluoroalkyl substances and microplastics in water and wastewater".



Ms. Sidhi Soman DST-Inspire Ph.D Fellow registered in the department of Chemistry, works under supervision of Dr. Paromita Chakraborty. Her research area focuses around "Fate of Legacy and Currently used pesticides in a typical Tropical Riverine Ecosystem".



Mr. Mithun K. DST-WTI Project fellow, registered with Dept. of Chemistry, works under supervision of Dr. Paromita Chakraborty on the Ph.D research topic entitled "Monitoring and Modelling of Legacy and Emerging contaminants of Concern along the Cauvery River, Tamil Nadu, India".



Mr. P. Naveen has registered for his Ph.D in the Dept. of Physics and Nanotechnology, he works under the mentorship of Dr. R. Suriyaprakash, REACH SRMIST. His research area focuses on applying nanotechnology for wound healing applications.

"LIVE SMART LOVE GREEN-BE AN EARTH TEEN"

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Participant List

Participant name	Designation	Department	Gender
Takumi Nagasaka	Research Scholar	Chemical Engineering	Male
Samira Khathoon	Student	Chemistry	Female
Varsha Boshy	Student	School of Public Health	Female
Dr. Amuthini E Indrakumar	Student	School of Public health	Female
Dr. Thenmozhi. P	Student	School of public health	Female
Vignesh K	Student	School of Public Health	Male
Naveen Kumar	Student	School of Public Health	Male
Lingesh kumar	Student	School of Public Health	Male
Dr K.Kanaka Parvathi	Faculty	College of Pharmacy	Female
Dr. Hemanth Kumar Chanduluru	Faculty	College of Pharmacy	Male
Dr. Bhavya T P	Student	School of public health	Female
P Mohammed Arish	Student	School of Public Health	Male
Dr. Deepika Lalwani	Student	School of Public Health	Female
Nazireen Banu	Student	School of Public Health	Female
Radha Sidhan	Student	School of Public Health	Female
Devadharshini	Student	School of Public Health	Female
Ragul.S	Student	School of Public Health	Male

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Nihila rubavathi	Student	School of Public Health	Female
Siva raman	Student	School of Public Health	Male
Raghunand Ashok	Research Scholar	Chemical Engineering	Male
M. Sudharsan	Student	Biotechnology	Male
James Ruban A	Research Scholar	Directorate of Learning and Development	Male
S. Baskarpandi	Student	School of Public health	Male
Jenifer Martin	Student	School of Public Health	Female
Dr. Induja R	Student	School of Public Health	Female
Satwika P	Student	School of public health	Female
L. Soundari	Research Scholar	Civil Engineering	Female
Anuja Dipak Wasnik	Student	School of Public Health	Female
Sathya	Student	School of Public Health	Female
Karmuhil Mathimozhiyazh V	Research Scholar	Biotechnology (E and T)	Female
Sowmya Narayanan Pk	Student	School of Public Health	Male
Irshana Shajahan	Research Scholar	Chemical Engineering	Female
Mriganki Singh	Student	Dept. of Physics and Nanotechnology	Female
Yuvanesh J	Research Scholar	Chemistry	Male
Lavanya Shankar Salian	Research Scholar	Biotechnology	Female

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1. Introduction:

Anthropogenic activities are causing a fast decline in environmental health, which is becoming an increasingly serious problem. Several concerning solutions and treaties are being developed to reduce the harmful impacts, which could potentially be dangerous in the long run. However, the solutions need to be sustainable and should not create further harm to the environment. With this understanding in the background, the “**Centre for Environment, Sustainability Advocacy and Climate Change (REACH)**,” Directorate of Research, SRMIST, designed a three-day certificate course on “**Environmental Health and Sustainability**”. One significant aspect is that everyone cares about the environment, and tackling its effects requires cooperation from all sectors. This training was conducted as part of the SDG 6 initiative for the International Conclave on SDGs 2025 event. Being an interdisciplinary coursework the program covered several other SDGs, in accordance with the expertise and research areas of expert members.

The main objective of this coursework is to educate students on the importance of environmental health and address the critical issue of environmental pollution and its impact on ecosystems. Led by REACH, in collaboration with international experts, the three-day event took place from March 11-13, 2025. A total of 37 participants from various SRMIST departments took part actively. The coursework was fabricated with expert talks (international and national) and hands-on training on instruments essential for environmental studies, followed by some group activities to encourage participants.

2. Day I Events

2.1 Inaugural session

Day 1 commenced with a welcome address by **Dr. B. Neppolian** Dean of the Directorate of Research, SRMIST. He conveyed the tremendous growth of SRMIST in recent years in the field of Research and Development and the promise for continuing this. The Subject Expert and Course Coordinator **Dr. Paromita Chakraborty**, Head, REACH further moved the session with an introductory talk and a message to the participants to involve actively and learn more from the Course. This was followed by felicitation of **Dr. Daniel D. Snow** Research Professor and Director of Water Sciences Laboratory, University of Nebraska-Lincoln, USA the Chief Guest of our program by Prof. B. Neppolian, Dean of the Directorate of Research and Dr. Paromita Chakraborty, Head, REACH, SRMIST.

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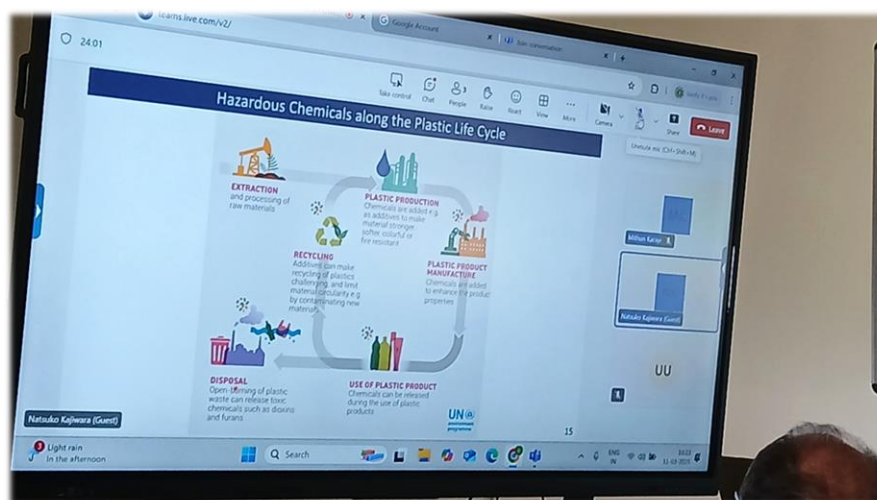


Felicitation of Dr. Daniel D. Snow by Dr. B. Neppolian and Dr. Paromita Chakraborty

2.2 Theoretical Session I

The inaugural session was followed by an Expert lecture from **Dr. Natsuko Kajiwara**, Senior Scientist at the National Institute for Environmental Studies, Japan. Her talk, titled “Chemicals of Concern in Plastics: The Global Imperative to Balance Chemical Management and the Circular Economy” focused on plastic pollution and its effects on the environment and human health. The lecture discussed the process of plastic production, the diverse types of Chemicals and plastic additives, their leaching into landfills, and making the recycling of plastics challenging. She discussed the importance of plastic recycling in maintaining a circular economy, sharing case studies from Japan. The key point of her talk was on Persistent Organic Pollutants (POP) management, disposal of plastic waste, and technical guidelines on POPs. The research contributions of Dr. Natsuko Kajiwara sharply focusses toward the fulfilment of **SDG Goal 9 “Industry, Innovation and Infrastructure”**, **SDG Goal 11 “Sustainable Cities and Communities”** and **SDG Goal 12 “Responsible Consumption and Production”**.

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Dr. Natsuko Kajiwara discussing how the Plastic based additives and chemicals are exposed in the environment



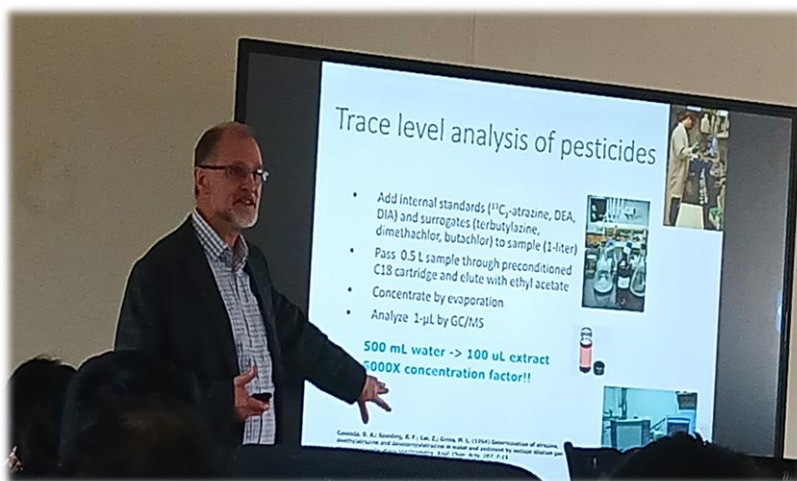
Dr. Natsuko Kajiwara discussing the amount of PBDEs present in our daily use items and accessories

2.3 Theoretical Session II

Dr. Daniel D. Snow, Research Professor and Director of Water Sciences Laboratory, from the University of Nebraska-Lincoln, USA, delivered his lecture on “Measuring Emerging Micropollutants”. His lecture discussed the detection and extraction of water-soluble contaminants which are present in a complex matrix. The high sensitivity of Mass Spectrometry (MS) which made trace level analysis of pesticides possible through GC-MS and LC-MS was the central point of his discussion. Application and essentiality of several MS detectors such as Single quadrupole and Tandem Quadrupole were discussed.

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Dr. Daniel D. Snow delivering his expertise on how to measure the trace level amounts of pesticides through GC-MS

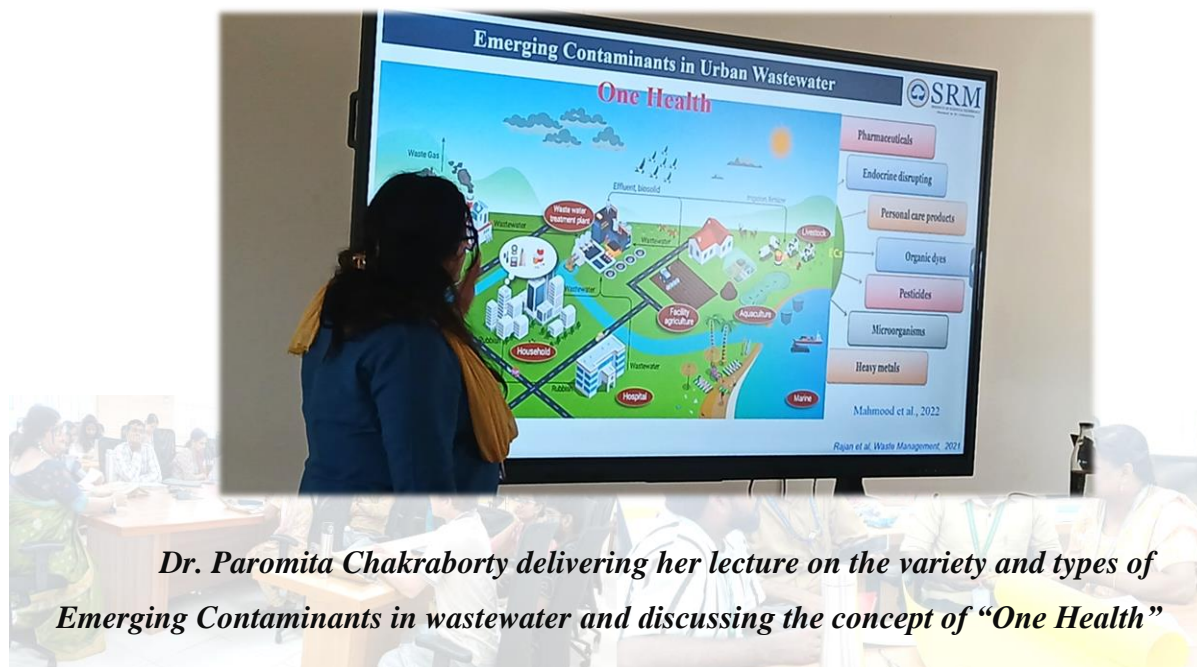
Sample preparation for the above analysis through solid and liquid phase extraction was discussed in detail. PFAS (Perfluoro and Polyfluoro alkyl substances) and micro/nanoplastics were annotated as “Future Priority Compounds” which require great attention and need to be detected in trace levels through MS analysis. The research contributions of Dr. Daniel D. Snow immensely work towards the implementation of **SDG Goal 6 “Clean Water and Sanitation”**, **SDG Goal 14 “Life below water”** and **SDG Goal 14 “Life on Land”**.



Demonstration of sample preparation methodologies through Liquid-Liquid and Solid Phase extraction techniques by Dr. Daniel D. Snow

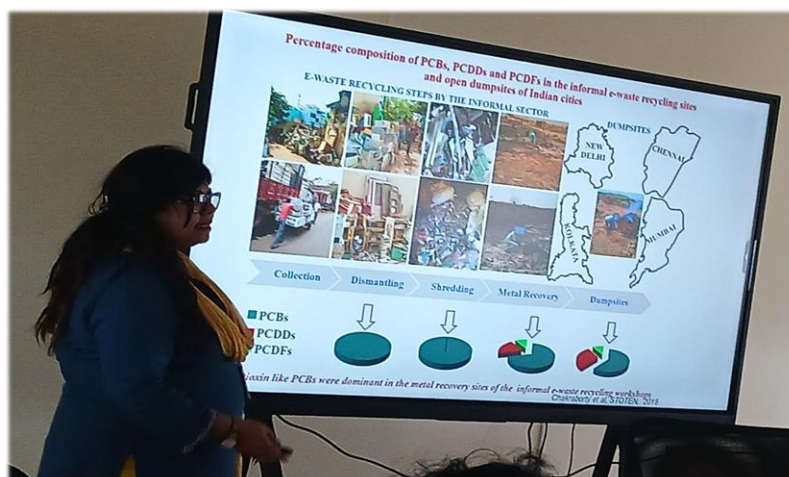
2.4 Theoretical Session III

In the afternoon session of the day, **Dr. Paromita Chakraborty** delivered her lecture on the topic “Micro-Organic Pollutants and Environmental Health”.



Her lecture discussed the “One Health” concept, which requires coordination and collaboration among various sectors including public health, environmental science and others to address complex health challenges. The lecture also emphasised on the generation of new emerging contaminants in wastewater including pesticide and degradation products, Pharmaceuticals and Personal care products (PPCPs), Endocrine disrupting compounds (EDCs), PFAS (Perfluoro and Polyfluoro alkyl substances). The imbalance created by above on One Health, the long-range transport of POPs, transformation and bioaccumulation effects were discussed. The presence of plastics in the electronic waste (e-waste) and the current recycling scenario and strategies to reduce exposure to e-waste was discussed. In the second part, she discussed how burning plastic wastes which is a usual common practice in our country is impacting air quality and causing serious health challenges. She shared research data along with personal insights on plastic pollution during the COVID pandemic. The requirement for Global monitoring of POPs, instruments used for the quantitative and qualitative analysis of these, POP capturing sorbent materials, theory and working principle was discussed. The research contributions of Dr. Paromita Chakraborty extremely project towards the execution of **SDG Goal 3 “Good Health and Well Being”**, **SDG Goal 5 “Gender Equality”**, **SDG Goal 6 “Clean Water and Sanitation”** and **SDG Goal 13 “Clean Water and Sanitation”**.

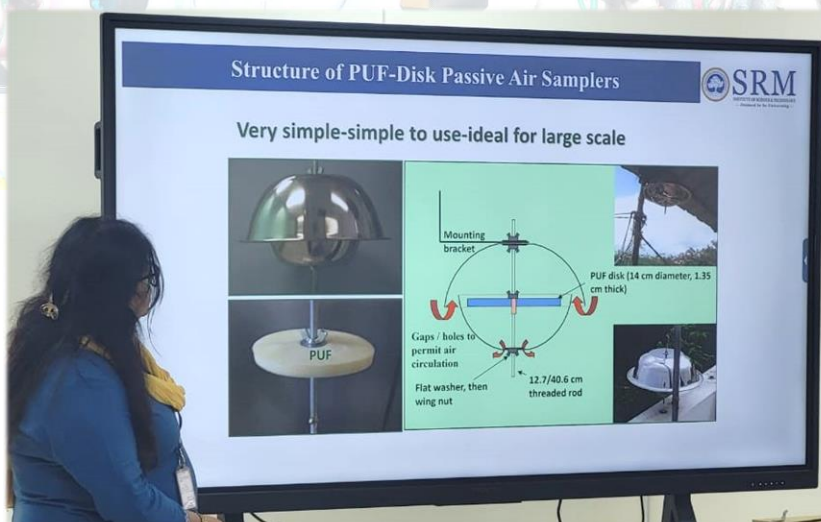
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Dr. Paromita Chakraborty discussing a Case Study on the leaching and percentage composition of several plasticizers in the informal e-waste recycling sites and open dumpsites of Indian cities

2.5 Lab session Day I - Demonstration of Air Sampling Devices

Following the lecture, the lab demonstration of the air samplers for advanced air quality analysis discussed in the previous lecture by Dr. Paromita Chakraborty was conducted by the research scholars and associates of REACH SRMIST, showcasing four different instruments: the PUF-PAS (Polyurethane Foam-based Passive Air Sampler), a lab-scale air sampler, and a portable air sampler with PM 10 and PM 2.5 capabilities.



Dr. Paromita Chakraborty discussing the structure and Fabrication of PUF - Disk based Passive Air Samplers

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Following the lecture, a demonstration session on advanced air quality analysis techniques was conducted by the research scholars and associates of REACH SRMIST. Students were divided into 8 groups: “**Violet, Indigo, Blue, Green, Yellow, Orange, Red and white (VIBGYOR & White)**” and were demonstrated separately for each air sampler.



Demonstration of PUF-PAS sampler



Demonstration of PM 2.5 air sampler



Demonstration of PM 10 sampler

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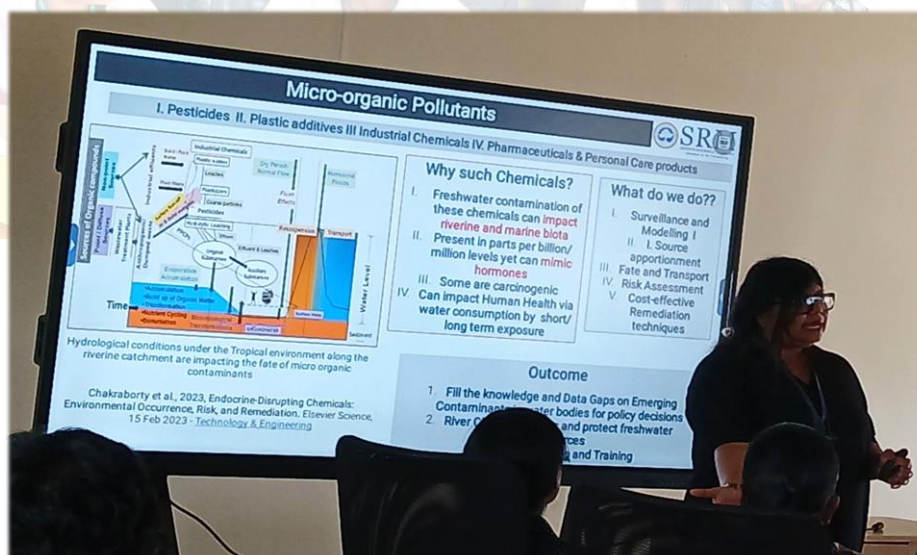


Demonstration of Portable Air sampling

3. Day II Events

3.1 Theoretical Session IV

The second day forenoon session started with a lecture by **Dr. Paromita Chakraborty** on the topic “Micro-organic pollutants interlinked to waste plastics: A sustainable way forward for developing economies”. The lecture focussed on the real time monitoring and analysis of micro and nano plastics as well as the advanced techniques used for water quality testing and for pollutant measurement and quantification.

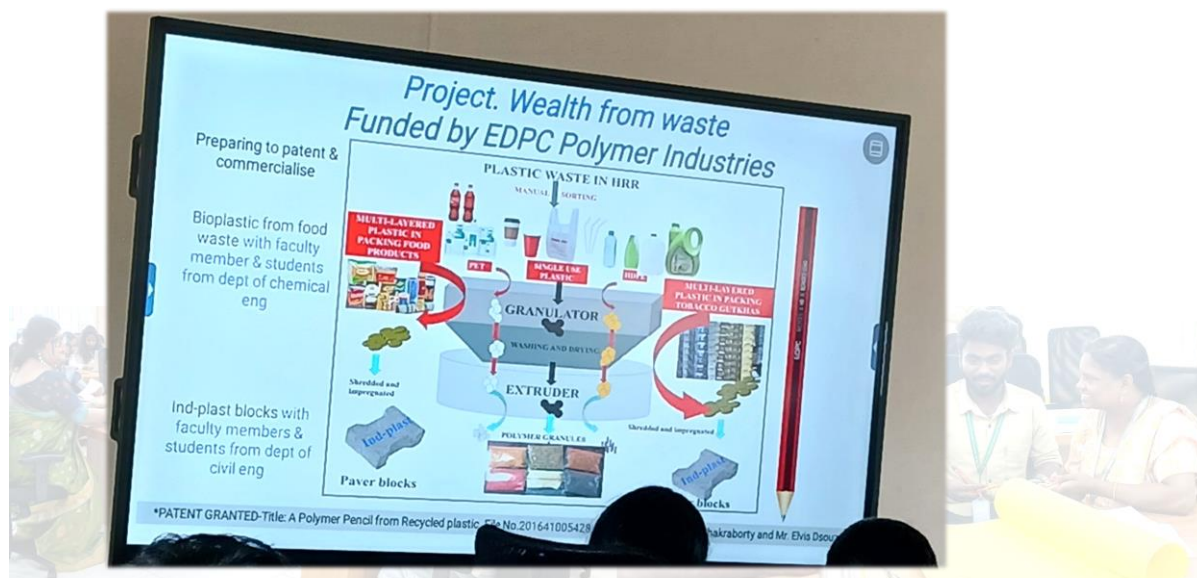


Dr. Paromita Chakraborty deliberating her talk on the types of Micro-organic Pollutants, their trace level presence in the environment and what methodologies and analytical methods the research team of REACH, SRMIST is applying for the detection and removal of such level of contaminants

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Contribution of REACH in several thrust areas of pollutant detection were discussed, which are divided into several verticals: Surveillance and Modelling, Source apportionment, Fate and Transport, Risk assessment, Life cycle assessment and development of cost-effective techniques for the remediation of organic micropollutants. A review on Projects running under “Wealth from Waste” funded by EDPC Polymer Industries was presented.



Dr. Paromita Chakraborty deliberating the studies going on and completed under “project Wealth from Waste”

3.2 Day II Lab Session

The above session was followed by a hands-on training session in the forenoon with lab demonstrations of several extraction strategies including liquid and solid phase extraction, column clean up, preparation of samples for GC-MS (Gas Chromatography-Mass Spectrometry) analysis, its operational criteria and analysis of chromatograms, and illustration of the working principle and running of UV-Visible spectrophotometer which is used for the detection and quantification of several water soluble organic contaminants.

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Demonstration of Liquid Phase Extraction



Demonstration of Solid phase extraction from soil sample

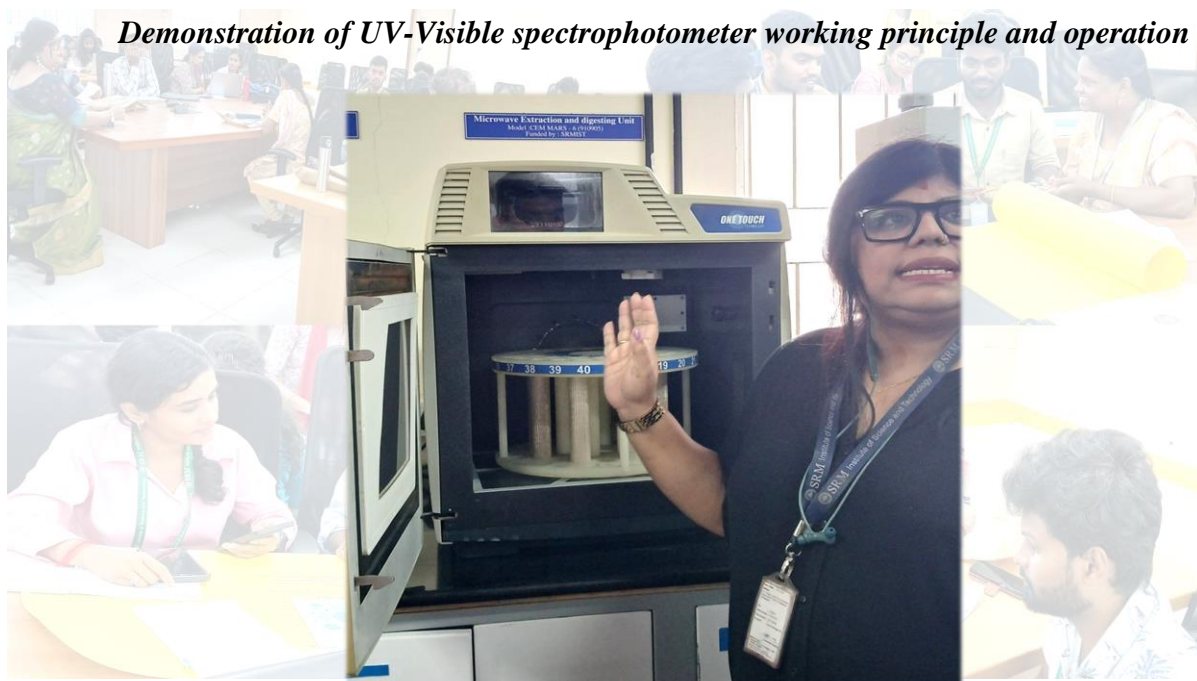


Demonstration of Column Clean up

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Demonstration of UV-Visible spectrophotometer working principle and operation



Demonstration of Microwave extraction and digestion unit for sample analysis through GC-MS

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Demonstration of GC-MS principle and operation

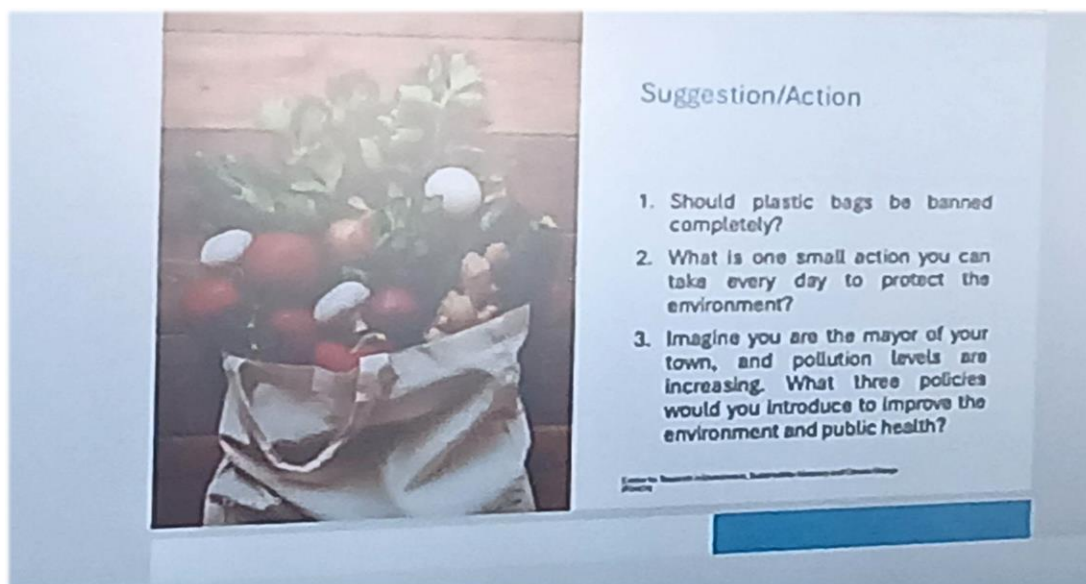
3.3 Theoretical Session V

The afternoon session included one lecture by **Dr. Pankaj Kumar**, National Project Coordinator from UNIDO, on the topic “Environmental Health- Impacted by Air and water, Climate Change, Waste management”. His lecture emphasised the development of sustainable ways for achieving a healthy lifestyle, the significance of Policy making, and suggestions or actions to be taken for the improvement of Environmental and Public health. The research area of Dr. Pankaj Kumar intensively focuses on **SDG Goal 3 “Good Health and Well-Being”** and **SDG Goal 7 “Affordable and Clean Energy”**.



Dr. Pankaj Kumar elaborating on the topic “Environmental Health - Impacted by Air and water, Climate Change, Waste management”

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Dr. Pankaj Kumar suggesting immediate actions for Smart Waste Management

4. Group activities and Learning of SDGs - Session conducted by Dr. Paromita Chakraborty

The forenoon session of the third day included an interactive discussion between participants and **Dr. Paromita Chakraborty**. The participants discussed the three days' learnings and cleared several queries. Several participants got their future research ideas from the analytical equipment demonstrated in the coursework. Several measures were suggested like using eco-friendly alternatives (for example cloth bags, earthen pots etc.) for reducing the use of plastic in our day-to-day life, organic farming was suggested for reduced use of pesticides and similar chemicals in agricultural lands, compositing of Siddha medicines with the modern allopathic medicines was suggested by participants from the School of Public Health, in order to have less side effects.

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Interactive discussion between participants and Dr. Paromita Chakraborty

4.1 Group activity and connecting SDGs with research

After this 2 h session, one write-up cum drawing quiz was organised for the participants. Participants were distributed in groups, as were for experimental demonstration and were given coloured chart papers and sketch pens (1 chart paper for each group). They were asked questions from theory and Lab classes; each part was carrying 50 marks. The session involved writing answers and drawing of schematic illustrations of the take-home ideas and learnings from the coursework. The above session was succeeded by demonstration of a PowerPoint presentation (PPT) by all groups in the afternoon session, elaborating the points they learnt in the coursework and where they are going to implement this, which was also carrying several marks and scores for this were given by the program coordinators and co-coordinators.



Questions asked from the participants about the lab and theory classes as a part of Quiz Competition

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4.3 Team work: Participants drafting the facts and techniques they learnt and the Take Home Ideas

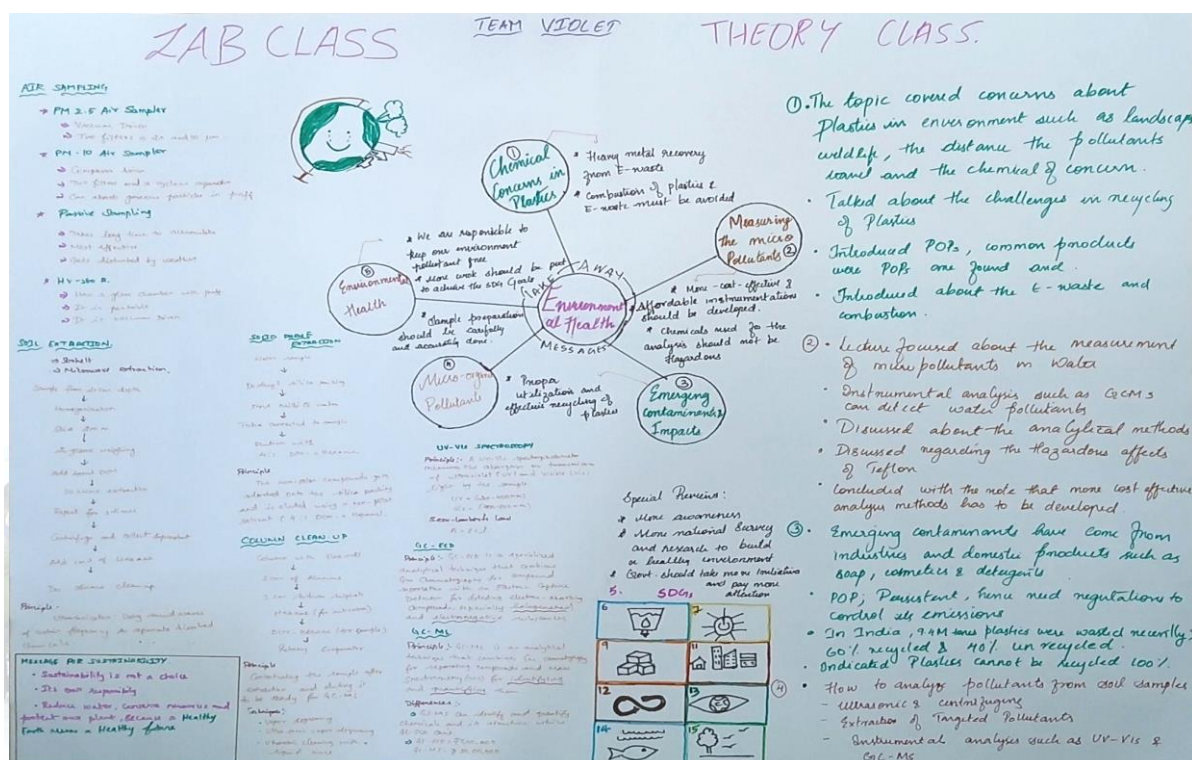


Participants engaged in drafting the learnings obtained from the Coursework

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4.4 Team Presentation:

Team Violet

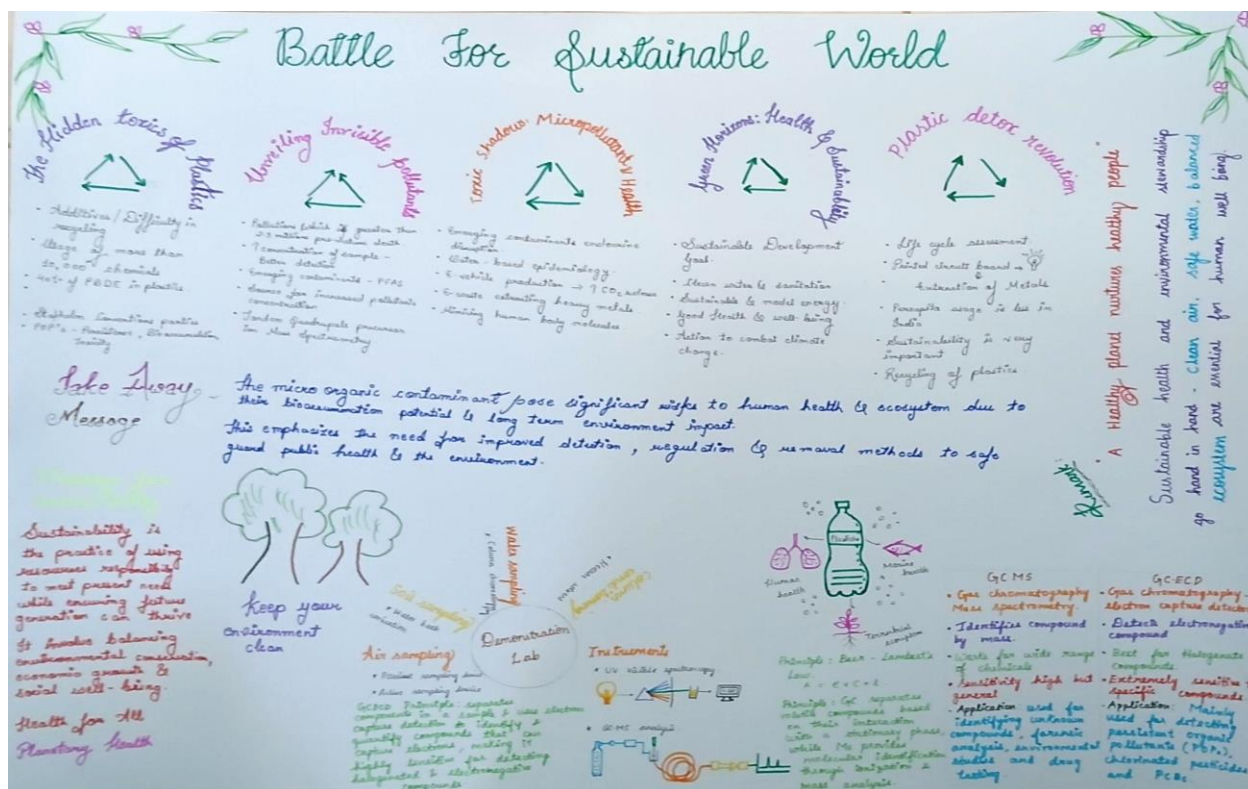


Team Violet members

Participant name	Designation	Department
Takumi Nagasaka	Research Scholar	Dept. of Chemical Engineering
Sudharsan M.	Student	Dept. of Biotechnology
Varsha Boshy	Student	School of Public health
Sowmya Narayanan PK	Student	School of Public health

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Team White



Participant name	Designation	Department
Nazireen Banu	Student	School of Public health
Dr. Deepika Lalwani	Student	School of Public health
Karmuhil Mathimozhiyazh V.	Research Scholar	Dept. of Biotechnology
P. Mohammed Arish	Student	School of Public health

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Team Green

SOURCE, DISTRIBUTION, ANALYSIS & MANAGEMENT OF MICRO POLLUTANTS

Learning Statement:

Source: Man made chemicals, intentionally produced & accidentally formed.

Characteristics of POP: Toxicity, persistent, Bioaccumulation, long range environmental transport.

Distribution: Microchemicals can travel long range of 2000 miles through soil, air, water & food and gets accumulated in colder regions.

Analysis: Low concentration micropollutants need high end instruments like LCMS, GCMS (10^{-9} to 10^{-12}). Calux assay for low cost determination for high sensitivity & specificity. Dioxane compounds at low concentration can also be detected and quantified. Some other techniques like pyrolysis GC for microplastics, extraction techniques for the detection of chemicals in environment.

Management: ① LCA ② Recycling plastics and converting them into oils, pavements, granules. ③ Sustainable techniques ④ Extended producer Responsibility ⑤ EDCs to make life better.

Take away: Any innovation needs to be analyzed for LCA and should have a simple recycling procedure when increased in large quantity. Researchers should work on the alternatives for the end cycle processing prior to the production.

Message on sustainability: The innovative product should not have any adverse effect on sky, rain, soil, water and living beings.

Special remarks:

LAB CLASS

① Air sampling
Name of the device: Active air sampling - Pm, Pa-5, passive air sampling - Cheap & effective.

Principle: cyclone separating for particle separation, adsorption for organic compounds capturing.

② Soil extraction : Liquid - Liquid extraction partition

③ SPE : For Bisphenol determination
Principle: Adsorption

④ Cleanup : **Principle:** Adsorption.

⑤ INTRUMENTAL ANALYSIS:
Principle: UV-Vis : Determination of molar energy in the electronic level after passing the UV light. Absorption of light absorbed or transmitted can be determined.
GC/MS: principle was partition. **GC/MS/MS:** molecule mass determination by ionization - MS/MS.

Difference between GCMS & GC/MS/MS:

- GCMS: Sensitive for wide range of compounds, Detection by mass no charge ratio, applicable for most of the compounds, high cost and maintenance.
- GC/MS/MS: highly sensitive >ppm, detection by free electron capture, applicable for electronegative compounds like halogen, low cost and maintenance.



Team members:

Participant name	Designation	Department
Dr. C. H. Hemanth Kumar	Faculty	College of Pharmacy
Satwika P.	Student	School of Public health
Nihila Rubavathi	Student	School of Public health
Vignesh K	Student	School of Public health

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Team Red and Indigo

ENVIRONMENT HEALTH AND SUSTAINABILITY

★ MANAGING HAZARDOUS CHEMICALS IN PLASTICS

- 1) Characteristics of POPs - Persistence bio-accumulation, toxicity, long term environmental transport.
- 2) Understanding chemical risk - Pesticides, fluorinated compounds, UV sterilizers, unintentional POPs.
- 3) Each party should - Prohibited, reduce, eliminate, & restricted.
- 4) Public awareness & consumer's choice
- 5) Regulatory & industrial responsibility.

TAKE-AWAY: Long range transport of POPs.
Long persistence in environment.
Toxic effect on environment & Human Health.

Message on sustainability: Use resources wisely, make choices to protect ENV.

Remarks: Along with recycling prioritize both env protection & Human health.

★ MESURING EMERGING MICROPOLLUTANTS

- 1) Emerging micro contaminants - New pesticides, degradation products, pharmaceuticals & antibiotics, hormones, plastic, e-waste, personal care products.
- 2) Pop. of antibiotics in waste water. 4) These pollutants pose risk to ecosystem & human health.
- 3) Tetracycline & macrolide antibiotics in soil.

5) Tech of measuring - chromatography - Based method
Mass spectrometry.

TAKE-AWAY: Strengthening monitoring systems & Regulatory framework will ensure safer & cleaner environment for future generations.

MS: Advanced detection technologies and greener alternatives are essential.
Responsible chemical use, improved waste water treatment & stronger regulation.

Remarks: Investing in advanced detection technologies green chemistry.

★ MICRO-ORGANIC POLLUTANTS & ENVI HEALTH

- 1) Sources - Industrial discharge, agri runoff, pharma waste, plastic degradation, household products.
- 2) Fresh water contamination of these chemicals can impact riverine & marine biota.
- 3) Present in parts per billion by million levels yet can mimic hormones.
- 4) Summer Carcinogenic can impact human health via water consumption/long term exposure
- 5) Endocrine disruption & antibiotic resistance.

TAKE-AWAY: Advance treatment technologies, stricter regulation & sustainable alternatives.
Responsible industrial practices, conscious consumer choices, scientific innovation.
Monitor, reduce, prevent these pollutants from entering our ecosystems.

MS: Innovative solutions ecofriendly alternatives.
Sustainable production, advanced pollution control measures.

Remarks: Pollution detection, waste treatment, green alternatives.
Strong policies, industries, accountability & public awareness.

★ MICRO-ORGANIC POLLUTANTS & SUSTAINABLE PATHWAY

PLASTIC WASTE: A sustainable pathway for developing economy.

- 1) Hazardous pollutants: pesticides, POPs, heavy metal.
- 2) Micro plastic absorb & transport toxins
- 3) Water pollution, soil degradation
- 4) Endocrine disruption, cancer, immunosuppression
- 5) E-waste
- 6) Limited infrastructure for plastic waste management.

TAKE-AWAY: Plastic waste carries harmful micro-organic pollutants.
Innovative waste management & strict policies.

MS: Ecofriendly alternatives, responsible waste management & community participation.

Remarks: Transition to circular economy is necessary for long term ecological & economic stability.

★ ENVIRONMENT HEALTH & SDG

- 7: Affordable & clean energy.
- 9: Industry & Innovation & Infrastructure
- 11: Sustainable cities & Communities.
- 12: Responsible consumption & production
- 14: Life below water.
- 15: Life on Land.

PRESENTED BY:

Dr. Bhavya
Dr. Amuthini E
Sathya
Radha S

AIR-SAMPLING METHOD

PVF-SAMPLER

Principle: Controlled air release & capture absorption on filtration.

Tech: Sorbent based & filter based impingement based & real time puff sampling.

PASSIVE-AIR SAMPLER

Principle: Diffusion or permeation process, no power requirement, time scaled average concentration.

Tech: Diffusion based, permeation based, adsorbent based, badge samplers passive sampling.

AMBIENT AIR PM 2.5 SAMPLER

Principle: Size selective sampling optical analysis continuous or integrated sampling.

Tech: Gravimetric filter based sampling, both attenuation monitor, low cost optical & laser PM 2.5 sensors, cyclone based.

HIGH VOLUME AIR-SAMPLER

SOIL-EXTRACTION

- Extraction of pollutants from soil
- Solid phase extraction
- Extracted amount reduced to 3ml.

FINAL ANALYSIS

ONE-HEALTH

Interconnection
Collaboration
Sustainability
Prevention oriented

RED & INDIGO.



Team members:

Participant name	Designation	Department
Dr. Bhavya TP	Student	School of Public health
Dr. Amuthini E. Indrakumar	Student	School of Public health
Sathya	Student	School of Public Health
Radha S.	Student	School of Public health

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Team Yellow

THEORY CLASS

LECTURE 1 :- CHEMICAL CONCERNS IN PLASTICS

- POP, PBDE, HBCD, PUF
- Soil fabrics - 920 mg / kg of PBDE, toys containing POP
- Plasticizer, Additives, life cycle Assessment. (Take Away)

Sustainability - Recycling, Reusing

LECTURE 2 :- ANALYTICAL TECHNIQUES OF MICROPOLUTANTS

- India - 1st Pollution Related death.
- MDL = $5 \times t_{n-1}$ 8σ standard deviation
- Limit - 10^{-9} - 10^{-12}
- SAMPLE - Polar or Non Polar
- Technique - GCMS, Tandem MS.
- Emerging Contaminants - Pesticide, Anti-biotics, Pharma.

LECTURE 3 :- MICRO ORGANIC POLLUTANTS + ENVIRONMENTAL HEALTH

- SDGs - Connected to environment - 3, 6, 14, 15, 17.
- UNEP
- HEAVY METALS - Pb, Hg, Cd
- India - 1st place in ship dismantling
- E-Waste, Hazardous - Precious metals (Ag, Au)
- Waste Recycling - 55000 M. USD
- Silence Spring, Giga.

LECTURE 4 :- PLASTIC WASTE PRODUCERS.

India - Telangana	PLASTIC CONSUMPTION	PLASTIC USAGE
TN	USA - 109 Kg/Person	Packaging - 45%
WB	EU - 65 Kg	Building - 17%
UP	China - 38 Kg	Electronic - 17%
Karnataka	India - 11 Kg	Consumer - 12%

Recycled Polymer - Leaching rapidly.

Leaching :- LDPE > Recycled PET > Virgin PET.

LECTURE 5 :- IMPACT ON WELL BEING.

Part-1 Environmental Health.

Part-2 SDGs - 6, 7, 9, 11, 12, 13, 14, 15.

Part-3 Environment Health and Safety.

LAB CLASS

1. AIR SAMPLING :-

PASSIVE - Q 3-5 m³/day, outdoor.

ACTIVE -

PORTABLE AIR SAMPLER :- Q 100-800 L/min, time

HV SAMPLER :- Cyclone Separator, fixed Q.

Filter Paper - PM 2.5.

Cup - PM 2.5

FINE PARTICULATE SAMPLER :- PM 2.5

2. SOIL EXTRACTION :-

- MICROWAVE EXTRACTION + DIGESTING UNIT.
- ROTARY EXTRACTOR.
- SOXHLET APPARATUS.

3. SOLID PHASE EXTRACTOR :-

WATER SAMPLE EXTRACTION.

METHOD - CONDITIONING.

SILICA GEL - ADSORBENT

HEXANE - SOLVENT (10ml)

4. CLEAN UP :- COLUMN

Na Sol - 2cm

S1 - 3cm

AL - 3cm

GLASS VIAL

NOVA POLAR

5. INSTRUMENTAL ANALYSES :-

UV-VIS - Spectrometer. Beer - Lambert Law

- 200-800 nm & 400-900 nm

- Transition 3 types

- Benzene for low energy to excite

- O₂, H₂O₂ for high energy.

GC-ECD

Volatility + ionization

GC-MS

Detecting electron capture ability.

Identify Quantity wide range of compounds

Specific Compounds.

Environmental Analysis, Forensics, forensic Analysis, Bio-Studies

Application - Pesticide Analysis, chemical safety.



Team members

Participant name	Designation	Department
James Ruban A.	Faculty	Directorate of Learning and Development
L. Soundari	Research Scholar	Dept. of Civil Engineering
M. Lingesh Kumar	Student	School of Public health
M. Naveen Kumar	Student	School of Public health

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Team Blue

THEORY CLASS

LECTURE-1 Chemicals of concern in plastic. The global imperative to balance chemical management and the circular economy

LEARNING STATEMENT

- Plastic & E-waste
- Recycled pellets
- Micro, Nano, Nanoplastics
- Additives in plastic
- Stockholm convention on POPs

TAKE AWAY

- Risks to ecosystem
- Require management

MESSAGE ON SUSTAINABILITY

- Adopting safer alternatives
- Regulating policies
- Reducing environmental harm
- Eliminating toxic additives

LECTURE-2 Measuring emerging micropollutants

LEARNING STATEMENT

- Analytical methods
- Analytical tools
- Extraction techniques
- Trace level analysis of pesticides
- Quantitative & Qualitative analysis
- LCMS

TAKE AWAY

- Measurement of micropollutants
- Accurate detection

MESSAGE ON SUSTAINABILITY

- Technological advancements
- Regular monitoring
- Sustainable strategies
- Investing in pollution detection
- Early detection

LECTURE-3 Microorganic pollutants and environmental health

LEARNING STATEMENT

- Long range transportation
- Emerging contaminants
- Endocrine disrupting chemicals
- Sampling microcontaminants in the
- Analyzing ignored environmental contaminants

TAKE AWAY

- Disrupts ecosystem and a public health challenge
- Bioaccumulation
- Persistence

MESSAGE ON SUSTAINABILITY

- Proper waste disposal
- Improved sanitation
- Sustainable agricultural practices
- Global cooperation

LECTURE-4 Microorganic pollutants interlinked to waste plastic: A sustainable way forward for developing economies

LEARNING STATEMENT

- Dichloromethane: Universal solvent
- Life cycle assessment
- SDG: Addressing environmental health
- Type of pollution
- Health impact of contaminants

TAKE AWAY

- Hampers microbial growth
- Antibiotic resistance
- Microbial degradation

MESSAGE ON SUSTAINABILITY

- Manage plastic-microbe integration
- Community waste management programs
- Plastic degradation

LECTURE-5 SPECIAL REMARKS: Enhanced monitoring: Using advanced technologies for detection

- Stronger policy regulation and waste management
- Increase public awareness and educate the impacts of pollutants
- Align with sustainability goals
- Reduce E-waste and implementing better e-waste recycling
- Technological advancement & interdisciplinary collaborations

LAB CLASS

AIR SAMPLING

NAME OF THE DEVICES

- PUF-PAS (Polymers from based passive air sampler)
- High volume air sampler PM10
- Biocapacity cabinet level 2M, 2.5
- Flow meter

TECHNIQUES: Active Air Sampling, Passive air sampling, Real time air sampling

PRINCIPLES: collecting contaminants and analyzing their concentration to assess risks

SOIL EXTRACTION

PRINCIPLES OF SOLID PHASE EXTRACTION (SPE) works on selectivity, retains target analyte on a solid adsorbent, for purification and analysis

PRINCIPLE OF SOXHLET EXTRACTION Soxhlet extraction continuously refluxes solvent to dissolve target compounds from a solid sample.

CLEAN UP: PH adjustments, Washing & removing interferences, Solvent exchange

INSTRUMENTATION

- UV-VISIBLE SPECTROSCOPY** is based on absorption of UV light by molecules causing electronic transition with absorbance following the Beer-Lambert law for analysis
- GC-MS** it combines GC separating the compounds based on volatility and MS for identifying them by their mass to charge ratio (M/Z)

DIFFERENCE BETWEEN GC-ECD & GC-MS

GC-ECD Gas chromatography-electron capture detector is highly sensitive for detecting **electrophilic** organic compounds like DDTs

GC-MS Gas chromatography mass spectrometry provides structural identification of compounds based on their mass-to-charge ratio (m/z)

LECTURE-5 Environmental Health & Sustainability

Learning objectives → SDGs: How pollutants affects health, waste management

Learning outcomes → addressing pollution challenges, local action, global cooperation

Learning activities → multisector collaboration, waste management



Team members

Participant name	Designation	Department
Dr. Induja R.	Student	School of Public health
Dr. Thenmozhi P.	Student	School of Public health
Dr. Kanaka Parvathi K.	Faculty	College of Pharmacy
Jenifer Martin	Student	Dept. of Civil Engineering
Sivaraman S.	Student	School of Public health

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Team Orange

*** LAB CLASS ***

LECTURE 3 :- * EMERGING CONTAMINANTS IN URBAN Wastewater *

- It includes pesticides, organohalogens, heavy metals and plastic.
- It is persistent in Environment, accumulates in Food chain.
- It Acts as an endocrine disruptors, mimicking Hormones.
- Waste management challenges & E-Waste
- Caffeine, Carbamazepine used as marker for pharmaceuticals.

TAKE HOME MESSAGE :- PCB emission Model for POP & i-POP

Sustainable Message :-

- Life Cycle Assessment
- Improve waste management laws.
- Eco-friendly agricultural practices.

SPECIAL REMARK :- Contaminants in waste water can be analysed statistically & Rectified.

LECTURE 4 :- * Environmental Health And Sustainability *

- Living and Non-living Involved in Environmental Health.
- quality of Environment influences Health.
- Role of students in environmental Health and Sustainability.
- 17 SDG'S
- Components of Environment

Take Home message :- "REDUCE - RECYCLE - REUSE"

Sustainable Message :- To create healthier Environment, by reducing waste, conserve energy and support eco-friendly initiatives.

*** Remark - Everyone Responsibility towards Environmental Health & :- future generation.**

LECTURE 5 :- * RECAP and Discussion of the Workshop *

- Different thoughts were discussed
- Micropollutants in air
- e-waste management
- Half life importance

Take Home Message :- Use of environmental Health in Various field.

Sustainability Message :- strict laws & policy to be formed.

LAB CLASS

SOLID PHASE EXTRACTION :- It is solid-liquid extractive technique, by which compounds that are dissolved in liquid are separated.

- Methanol, Milli Q water is used. DCM is used as a Solvent.

COLUMN UP :- It is used for phthalates

- Glass wool, Baked Alumina, Baked Silica Gel, Sodium is used in different ratio
- DCM Hexane is used 1:1. (Varies for different compounds).

Principle :- It is based on selective retention & subsequent elution of analytes.

Instrumental Analysis :-

UV-Principle :- It measures the absorption of UV lights revealing about their structure & concentration

QC-ECD :- Gas chromatography - Electron Capture Detectors

Principle :- separates & detects molecules based on their ability to capture electron.

QC-MS :- Gas chromatography Mass spectrometry

Principle :- Identifying & quantifying by their mass to Charge Ratio.

Difference :- QC-ECD is sensitive as compared to QC-MS.

- cost difference.

- Samira Khathoon K

- Baskar Pandey S

- Anuja Wasnik



Team members:

Participant name	Designation	Department
Samira Khathoon K.	Student	Dept. of Chemistry
Baskar Pandey S.	Student	School of Public health
Anuja Dipak Wasnik	Student	School of Public health

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5. Closing remarks and Prize Distribution

The Valedictory function was led by **Dr. Paromita Chakraborty**, in the presence of **Dr. Daniel D. Snow** and **Dr. B. Neppolian**. Prof. Daniel D. Snow and Dr. B. Neppolian were honored by Dr. Paromita Chakraborty for their great support and immense contribution for the successful completion of the coursework. On the basis of scores obtained for the team activity for delivering the answers for various questions asked in the quiz and team presentations presented by VIBGYOR and White Groups First, Second and Third positions were decided. Participation and organisation certificates were awarded to all participants, teaching assistants and program co-coordinators. Team Violet, Blue and White were awarded as First, Second and Third scores based on the performance of these groups in schematics, PowerPoint presentation, knowledge, and defense. All participants were awarded glass water bottles which is one sustainable alternative for replacing plastic-based bottles and containers.



Evaluation of illustrations by course mentors and score distribution



Felicitation of Dr. B. Neppolian by Dr. Paromita Chakraborty

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Dr. Paromita Chakraborty promoting Glass bottles as a sustainable alternative to Plastic based bottles and containers



Award Distribution to the Prize winners of the Certificate course

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Certificate of Achievement provided to First Second and Third prize winners



CERTIFICATE OF ACHIEVEMENT

This Certificate is Proudly presented to

Takumi Nagasaka

Department of Chemical Engineering, SRMIST

for their exceptional performance in the group activities and won **First prize** during certificate course on **"Environmental Health & Sustainability"** conducted during March 11-13, 2025

Organized by
**Centre for Research in Environment, Sustainability Advocacy, and Climate Change (REACH),
Directorate of Research, SRMIST, Kattankulathur, Chennai**


Prof. B. Neppolian
Advisor
Dean - Research, SRMIST


Prof. Paromita Chakraborty
Program coordinator
Head, REACH, SRMIST



CERTIFICATE OF ACHIEVEMENT

This Certificate is Proudly presented to

Satwika P

School of public health, SRMIST

for their exceptional performance in the group activities and won **Second prize** during certificate course on **"Environmental Health & Sustainability"** conducted during March 11-13, 2025

Organized by
**Centre for Research in Environment, Sustainability Advocacy, and Climate Change (REACH),
Directorate of Research, SRMIST, Kattankulathur, Chennai**


Prof. B. Neppolian
Advisor
Dean - Research, SRMIST


Prof. Paromita Chakraborty
Program coordinator
Head, REACH, SRMIST

REACH, SRMIST



CERTIFICATE OF ACHIEVEMENT



This Certificate is Proudly presented to

Dr. Deepika lalwani

School of public health, SRMIST

for their exceptional performance in the group activities and won **Third prize** during
certificate course on **"Environmental Health & Sustainability"** conducted during

March 11-13, 2025

Organized by

**Centre for Research in Environment, Sustainability Advocacy, and Climate Change (REACH),
Directorate of Research, SRMIST, Kattankulathur, Chennai**

Prof. B. Neppolian

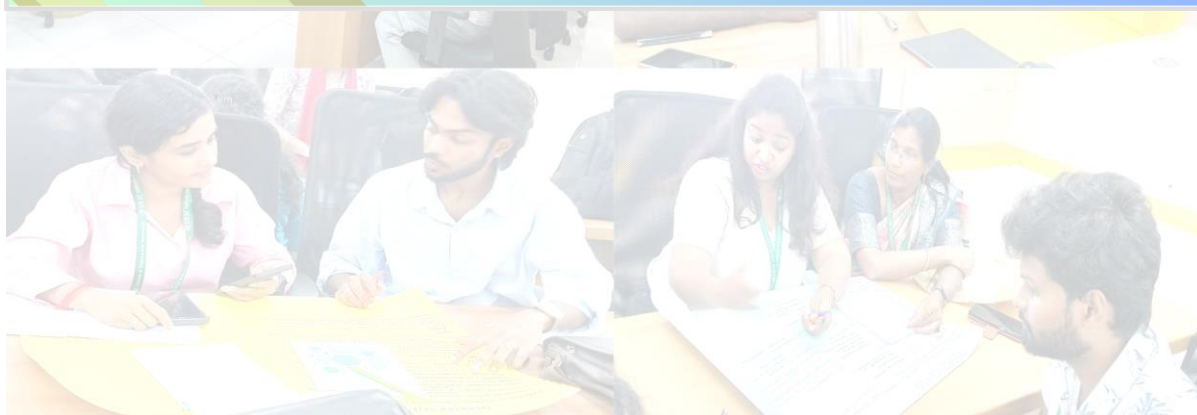
Advisor

Dean - Research, SRMIST

Prof. Paromita Chakraborty

Program coordinator

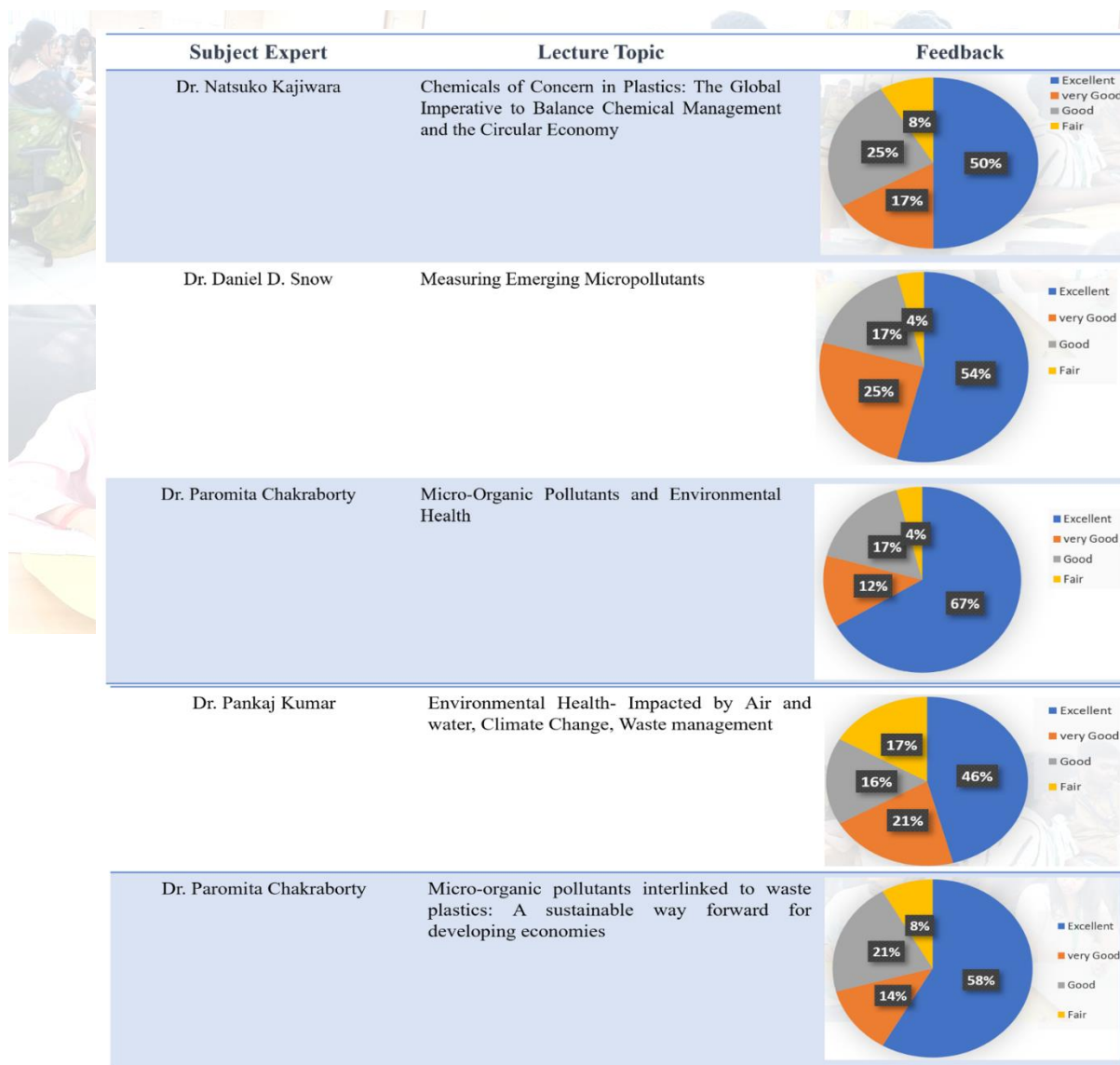
Head, REACH, SRMIST



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6. Feedback provided by Participants

We appreciate the feedback, comments, and questions received from the participants. They expressed interest in more practical, hands-on training sessions focused on environmental analysis techniques and sample collection. Many also suggested including well-organized group discussions in future events. The participants found the program beneficial for their Ph.D. research and appreciated the global interactions. They praised the informative and well-structured nature of the training and expressed interest in future discussions on POPs. Overall, the feedback was very positive. Also, we would like to inform that among 37 participants registered in the program, 21 female and 16 male candidates were there. The Gender ratio chart for this is provided here.



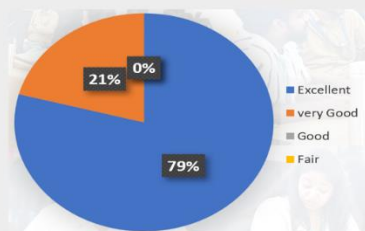
Feedback provided by participants on the Lectures of the Subject Experts

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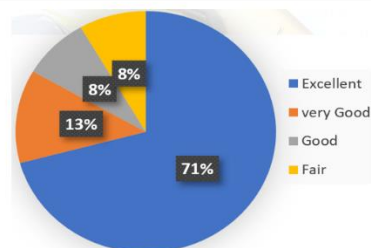
Categories

Feedback

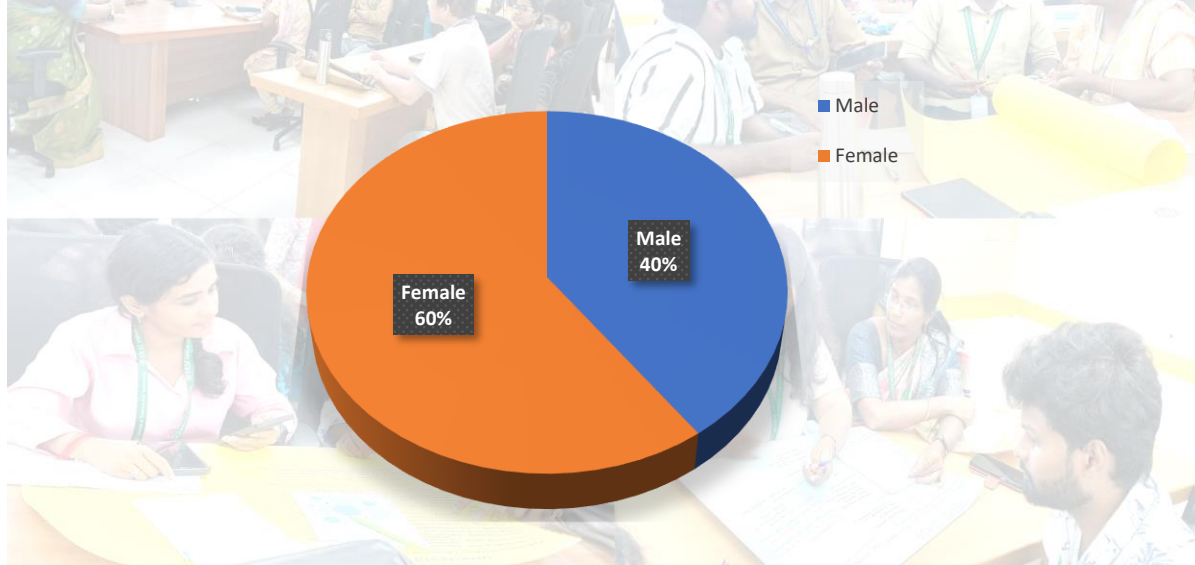
Feedback for Overall Lectures



Feedback for Overall Lab sessions



Feedback for overall Lab and Lecture sessions



Female and Male Participants registered in the program

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In the words of Participants

“I have always been deeply connected to nature and strongly believe that we must be the change to bring about a sustainable future. Pollution and environmental degradation are pressing concerns, and I am committed to contributing towards a cleaner, healthier planet. This passion led me to pursue research in environmental waste remediation and microplastics upcycling from municipal dump yards at SRMIST” Karmuhil Mathimozhiyazh V. [Research Scholar, Dept. of Biotechnology, SRMIST]

“Concerning on environment, where I live” L. Soundari [Research Scholar, Dept. of Civil Engineering, SRMIST]

“Passionate about safeguarding environmental health, I am eager to gain hands-on expertise in water and air quality monitoring. This course will equip me with the skills to analyze pollutants, implement sustainable solutions, and drive impactful change in public health and environmental policy.” Dr. Thenmozhi P. [Masters Scholar, School of Public Health, SRMIST]

“Interested to learn more about, how pollution affects environmental health and biodiversity. How to prevent, reduce and control to have better life (one health)” Dr. Amuthini E. Indrakumar [Masters Scholar, School of Public Health, SRMIST]

SMALL ACTIONS BIG IMPACT: REDUCE, REUSE, RECYCLE



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