(Form for the Submission of Proposal)

Global e-Learning Program for International Students and Faculties
(IIT-I Global e-Learning Program)
International Relations Office
Indian Institute of Technology Indore

1	Title of the Global e-Learning Program (e.g.: "Machine Learning in Energy Science")	**Emerging Contaminants in Waste and Water: Occurrence, Risks, Monitoring, and Sustainable Mitigation Strategies**
2	Proposed dates and duration of the program	Proposed Dates: **April 24 - 28, 2026** Program Duration: 6 Hours
3	Name of the Course Coordinator(s) (Name, Designation, Department, email, contact number)	**Dr. Mayur Shirish Jain** Assistant Professor Department of Civil Engineering Indian Institute of Technology Indore mayur.jain@iiti.ac.in + 91 731 660 3384
4	Details of the Course Instructor(s) from IIT Indore (Name, Designation, Department, email, contact number)	**Dr. Mayur Shirish Jain** Assistant Professor Department of Civil Engineering Indian Institute of Technology Indore mayur.jain@iiti.ac.in + 91 731 660 3384 **Prof. Kiran Bala** Professor Mehta School of Sustainability Indian Institute of Technology Indore kiranb@iiti.ac.in +91 731 6603266
5	Names of the Proposed invited experts outside IIT Indore (Name, Designation, Department/Institute, email, contact number)	NA

6	Details and Modules of the program (Lectures and Tutorials)	**Module 1:** *Introduction to Emerging Contaminants (1 Hour)* o Definition and classification of emerging contaminants (ECs) o Pharmaceuticals, personal care products (PPCPs), endocrine disrupting compounds (EDCs), PFAS, microplastics, antibiotic resistance genes (ARGs) o Why conventional treatment systems fail to address ECs o Global and regional (Asia–Africa) perspective. **Module 2:** *Sources, Pathways, and Environmental Fate (1 Hour)* o Municipal, industrial, agricultural, and hospital waste streams o Transport mechanisms in surface water, groundwater, and soil o Bioaccumulation, persistence, and transformation products o Case studies from developing and developed regions **Module 3:** *Ecological and Human Health Risks (1 Hour)* o Toxicological impacts at trace concentrations o Endocrine disruption, antimicrobial resistance, chronic exposure risks o Risk assessment frameworks for emerging contaminants o Regulatory challenges and gaps in existing standards **Module 4:** *Monitoring, Detection, and Analytical Techniques (1 Hour)* o Sampling strategies for water, wastewater, sludge, and solid waste o Conventional vs advanced analytical tools (Chromatographic/spectroscopic/microscopic methods) o Data interpretation and uncertainty in EC analysis

		○ Challenges in low-concentration detection **Module 5:** *Treatment and Mitigation Strategies (1 Hour)* ○ Advanced oxidation processes (AOPs) ○ Adsorption-based systems (biochar, activated carbon, novel materials) ○ Nature-based and hybrid treatment solutions ○ Circular economy approaches for waste and wastewater management ○ Biological/enzymatic possibilities **Module 6:** *Policy, Sustainability, and Future Directions (1 Hour)* ○ Global regulatory frameworks and monitoring programs ○ Integration of EC management into sustainable water systems ○ Research gaps and future research opportunities ○ Interactive discussion and participant engagement
7	Target groups (UG/PG/Ph.D. Students or Faculties)	Undergraduate students (final year), Master's students, Ph.D. research scholars, Early-career faculty members.
8	Pre-Requisites and Minimum Education Qualification (if any)	• Basic understanding of environmental science or engineering. • Prior coursework or background in water/wastewater engineering, environmental chemistry, or sustainability is desirable but not mandatory.
6	How will this program benefit the participants? (in bullet points)	• Develop a clear conceptual understanding of emerging contaminants in waste and water. • Gain exposure to real-world case studies and global research trends • Understand advanced monitoring and treatment technologies beyond conventional systems

(Form for the Submission of Proposal)

Global e-Learning Program for International Students and Faculties
(IIT-I Global e-Learning Program)
International Relations Office
Indian Institute of Technology Indore

		• Build capacity to integrate sustainability and circular economy concepts in EC management • Enhance research readiness for higher studies, international collaboration, and funded projects • Strengthen interdisciplinary thinking across engineering, policy, and environmental health
Submitted by  (Dr. Mayur S Jain) **26/12/2025** Course Coordinator(s)		**Approval and Remarks** (Signature and Date) Dean, International Relations, IIT Indore