(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	**Introduction to Artificial Intelligence in Life Cycle Assessment (LCA) of Waste Management Systems**
2	Proposed dates and duration of the program	**July 13 – 18, 2026** **5 Days & 9 hours**
3	Name of the Course Coordinator(s) (Name, Designation, Department, email, contact number)	**Dr. Ashootosh Mandpe** *Assistant Professor (Grade-I)* *Department of Civil Engineering* *as_mandpe@iiti.ac.in* *0731-660-3257; +91 827596405*
4	Details of the Course Instructor(s) from IIT Indore (Name, Designation, Department, email, contact number)	**Dr. Ashootosh Mandpe** *Assistant Professor (Grade-I)* *Department of Civil Engineering* *as_mandpe@iiti.ac.in* *0731-660-3257; +91 827596405*
5	Names of the Proposed invited experts outside IIT Indore (Name, Designation, Department/Institute, email, contact number)	**Dr. Anish Ghimire** *Assistant Professor, Environmental Engineering and Management* *Department of Water Resources and Environmental Engineering,* *School of Engineering and Technology,* *Asian Institute of Technology, Pathum Thani 12120 Thailand* *anish-ghimire@ait.ac.th; anishghimire@gmail.com* *+66 0959402978; +66 2 524 6186*
6	Details and Modules of the program (Lectures and Tutorials)	**Module 1 – 1 Hour** ***Introduction to Waste Management Systems & Environmental Impacts***

		• Overview of municipal solid waste, organic waste, and industrial waste systems • Environmental challenges: GHG emissions, resource depletion, toxicity • Role of waste management in climate change mitigation and circular economy **Module 2 – 1 Hour** ***Fundamentals of Life Cycle Assessment (LCA):*** • LCA framework: goal & scope, inventory, impact assessment, interpretation • Functional unit, system boundary, and allocation concepts • Introduction to LCA tools and databases (OpenLCA, Ecoinvent, SimaPro) **Tutorial 1: Introduction to LCA Software and Data Interpretation** • Understanding LCA input-output datasets • Running a simple waste management LCA case • Interpreting impact categories and results **Module 3 – 1 Hour**

		Fundamentals of Life Cycle Assessment (LCA): Advanced • Life cycle impact assessment and interpretation • Allocation concepts in waste management systems • Comparative assessment of waste treatment options **Module 4 – 1 Hour** ***Limitations of Conventional LCA in Waste Management*** • Data uncertainty and variability • Static vs dynamic systems • Regional and temporal limitations • Need for data-driven and AI-assisted LCA approaches **Tutorial 02: Advanced LCA Modeling and Scenario Interpretation** • Scenario-based LCA comparison • Sensitivity to key parameters • Interpretation of uncertainty in results **Module 5 – 1 Hour** ***Introduction to AI-Assisted LCA of Waste Management Systems***

		• Conceptual overview of AI and ML (non-technical) • AI-assisted life cycle inventory prediction • Emission estimation (CO_2, CH_4, N_2O) using data-driven models • Role of AI as a support tool in LCA studies **Module 6 – 1 Hour** ***AI-Assisted Emission Prediction and Decision Support*** • Demonstration of regression-based ML models (conceptual) • Predicting emissions from waste treatment options • Interpretation of AI-assisted outputs for sustainability assessment **Tutorial 03: AI-Assisted Comparison of Waste Management Scenarios** • Composting vs landfilling vs waste-to-energy • AI-supported scenario screening • Linking results to environmental policy and decision-making
7	Target groups (UG/PG/Ph.D. Students or Faculties)	UG, PG, and Ph.D., and Faculties

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8	Pre-Requisites and Minimum Education Qualification (if any)	None
6	How will this program benefit the participants? (in bullet points)	• Develop a clear understanding of **LCA methodology for waste management systems** • Learn how **AI can improve accuracy, speed, and decision-making in LCA studies** • Gain hands-on exposure to **AI-assisted sustainability assessment** • Understand emission reduction strategies through **data-driven analysis** • Build interdisciplinary skills at the intersection of **AI, waste management, and climate mitigation**