



Indian Institute of Chemical Engineers (TI)

IChE-Kongu Engineering College-Student Chapter



IChE-Erode Regional Centre

in Association with

Indian Chemical Society (ICS)



First Edition of IChE-TI Hardware Hackathon

IChE-ChEMATHON

Theme: **Redefining Progress Through Sustainable Solutions**

28th Feb - 2nd March 2025

Venue: **KONGU ENGINEERING COLLEGE, Perundurai, Tamil Nadu**

Website: <https://chemathon2025.kongu.edu>

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ABOUT IChE-ChEMATHON



“Innovation is no longer a choice; it has become an imperative.”
– *Shri Narendra Modi*
(Honorable Prime Minister of India)

IChE-ChEMATHON, the annual hardware hackathon organized by the Indian Institute of Chemical Engineers (IChE) Training Institute and Indian Chemical Society (ICS), is a unique event that brings together students from diverse engineering disciplines to develop innovative hardware solutions based on the United Nations’ Sustainable Development Goals (SDG6, SDG7, SDG9, SDG11, SDG12, SDG13). The event serves as a platform for participants to engage with real-world challenges in areas such as sustainability, process optimization, and industrial innovation. IChE-ChEMATHON 2025, hosted by the IChE KEC Student Chapter, Department of Chemical Engineering, Kongu Engineering College, Perundurai and Erode Regional Centre, will feature collaborative problem-solving, mentoring from industry experts, and hands-on project development. This year’s event promises to push the boundaries of creativity and technological advancement, with the participation of top professionals, researchers, and students from across the country.



About Organizing Institute



Kongu Engineering College (KEC), established in the year 1984, approved by AICTE, New Delhi and affiliated to Anna University, Chennai has completed 40 years of dedicated and excellent service in the field of technical education. It offers 14 UG, 4 PG and 16 Research programmes in Engineering, Applied Sciences and Management branches. The Institution has got A++ accreditation from NAAC, Best Engineering College award, the Best Principal Award twice and the Swachh Campus Award.

The Institution is one of the best self-financing engineering colleges imparting high quality technical education in India. In NIRF survey, the institution bagged the 118th rank among all Engineering Colleges in India including NITs and IITs. TBI at KEC is supported by the Department of Science and Technology (DST), Govt. of India has won a National Award and incubated over 100+ start-up industries.



About Organizing Department & IChE Erode Regional Centre



The Department of Chemical Engineering, started in 1994, offers B.Tech. Degree programme in Chemical Engineering and it is a recognized research centre by the Anna University, Chennai and accredited by NBA-Tier I (Washington Accord). The department focuses on imparting excellent technical knowledge to the students to meet the needs of industries and research as well.



The IChE-KEC Student Chapter, started in the year 2001, aims to promote research interest in Chemical Engineering and has organized programs including seminars, guest lectures, symposia and workshops. The Chapter has 150+ student members and won Ambuja's Best Student Chapter Award for the year 2017 and Pidilite Industries Best Student Chapter Award for the years 2018 and 2022. The Erode Regional Centre of the Indian Institute of Chemical Engineers is located at the Kongu Engineering College, Perundurai.



IChE-ChEMATHON 2025

PROBLEM STATEMENTS

SDG6 - Clean Water and Sanitation

1. Design a low-cost, portable water purification device using sustainable materials.
2. Develop an IoT-based water quality monitoring system for rural areas.
3. Innovate a membrane technology for efficient desalination with reduced energy consumption.
4. Create a smart rainwater harvesting system for industrial use.
5. Develop a decentralized wastewater treatment system for small communities.
6. Design an automatic irrigation system using recycled wastewater.
7. Create a biosensor for real-time monitoring of heavy metals in water.
8. Innovate a compact system for removing microplastics from wastewater.
9. Design a self-sustaining sewage treatment unit using microbial fuel cells.
10. Create a low-energy, solar-powered system for arsenic removal from groundwater.



SDG7 - Affordable and Clean Energy

1. Develop a portable hydrogen generator for off-grid energy storage.
2. Design an efficient waste-to-energy conversion unit for small industries.
3. Innovate a chemical storage system for renewable energy.
4. Create a thermoelectric device that harvests industrial waste heat.
5. Develop a bio-battery using organic waste materials.
6. Design a low-cost electrolyzer for hydrogen production.
7. Create a modular solar thermal energy storage system.
8. Innovate a carbon capture and utilization (CCU) device for small-scale applications.
9. Design a hybrid energy system combining solar and chemical energy storage.
10. Create a chemical-based system for improving battery recycling.

7 AFFORDABLE AND CLEAN ENERGY



SDG9 - Industry, Innovation, and Infrastructure

1. Develop a smart IoT-based chemical reactor monitoring system.
2. Innovate a process safety device for high-risk chemical plants.
3. Create a modular, portable chemical plant for rural industrialization.
4. Design an AI-driven quality control system for chemical manufacturing.
5. Develop a self-maintaining pipeline monitoring system for petrochemicals.
6. Create a predictive maintenance tool for rotating equipment in industries.
7. Innovate a smart packing column with real-time data integration.
8. Design a low-cost, automated mixing system for multiphase reactions.
9. Create a hardware solution for reducing process emissions in industries.
10. Develop a drone-based solution for industrial gas leak detection.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



SDG11 - Sustainable Cities and Communities

1. Design a compact air purification system for urban use.
2. Innovate a decentralized system for biogas generation in urban areas.
3. Create a smart waste segregation and processing system for households.
4. Develop a chemical solution for reducing urban heat islands.
5. Design a modular wastewater reuse system for apartments.
6. Innovate an eco-friendly paint that reduces building energy consumption.
7. Create a hardware-based solution for converting organic waste into value-added products.
8. Develop an IoT-enabled odor management system for urban waste.
9. Design a sustainable material for urban infrastructure with reduced carbon footprint.
10. Innovate a smart flood control system for cities using real-time data.

11 SUSTAINABLE CITIES AND COMMUNITIES





IChE-ChEMATHON 2025 PROBLEM STATEMENTS

12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



SDG12 - Responsible Consumption and Production

1. Develop a real-time tracking system for monitoring industrial waste.
2. Design a chemical-based solution for upcycling plastic waste.
3. Create an automated system for waste heat recovery in industries.
4. Innovate a portable composting device for biodegradable waste.
5. Develop a solution for minimizing solvent use in chemical processes.
6. Design a process for converting food waste into bioplastics.
7. Create a smart inventory system to reduce raw material waste in industries.
8. Innovate a sustainable packaging material using chemical engineering principles.
9. Develop a solution for recycling rare-earth elements from e-waste.
10. Create an efficient chemical process for valorizing textile waste.

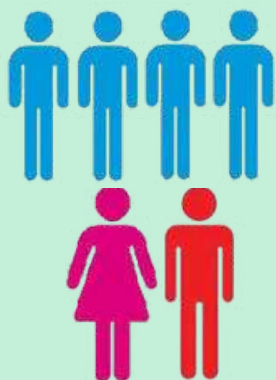
SDG13 - Climate Action

1. Design a carbon capture and storage (CCS) unit for small industries.
2. Innovate a low-cost device for monitoring greenhouse gas emissions.
3. Create a hardware-based solution for improving energy efficiency in homes.
4. Develop a system for real-time tracking of carbon footprint in manufacturing sectors.
5. Design a solar-powered device for direct air capture of carbon dioxide.
6. Create a process for reducing methane emissions in agriculture.
7. Innovate a bio-based solution for stabilizing soil carbon.
8. Develop a chemical system for converting carbon dioxide into useful chemicals.
9. Design a tool for predicting and managing industrial climate risks.
10. Create a device for storing renewable energy in extreme climates.

13 CLIMATE
ACTION



IChE-ChEMATHON 2025 SELECTION PROCESS



Teams are invited for online submission with a maximum of 5 members, including 1 compulsory female participant and 1 mentor

An email with a template will be sent to the shortlisted teams, and the prelims will be conducted online during the evening

1 2

hours

3 4

An email will be sent for registration to the prelims shortlisted teams for 36-hour finale, which will be held at Kongu Engineering College from 28.02.2025 onwards (42 teams, 7 from each SDG).

The grand finale presentation will take place on 02.03.2025 in the evening, featuring 12 teams (2 from each SDG). In that, 3 teams will be selected as winners, with prizes of ₹1 Lakh, ₹50 K, and ₹30 K



**ONLINE
Google Meet**



**HACKATHON
@KEC**



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Gold: Rs. 1,00,000 High Tea: Rs. 50,000 / day
Silver: Rs. 75,000 Registration Kit: Rs. 75,000

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(per person)

	IChE Member	Non Member
Student (UG/PG)	Rs. 750	Rs. 1000
Research Scholar	Rs. 1000	Rs. 1500

**No Spot Registration *Prelims will be online

IMPORTANT DATES

Idea Submission Opening	26.12.2024
Idea Submission Closing	15.01.2025
Prelims for ChEMATHON*	17.01.2025
Shortlisted Announcement	20.01.2025
Registration Opening	25.01.2025
Registration Closing	31.01.2025
Grand Finale	28.02.2025 to 02.03.2025

"Prize Contributions By"

First Prize: Rs. 1 Lakh

**Second Prize:
Rs. 50 K**

**Third Prize:
Rs. 30 K**



Bhumistha Infra Services,
Navi Mumbai



Central Institute of Petrochemicals
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Indian Chemical Society



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Name: IChE-ChEMATHON 2025, SB A/C No: 1247155000136579, IFSC Code: KVBL0001247, MICR:638053013, KVB Bank, KEC Nagar Branch, Thoppupalayam, Perundurai, Erode -638060

The Organising Secretary
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