



CLEAN WATER AND SANITATION

GOVERNANCE AND OPERATIONS

UCSI University supports Sustainable Development Goal 6 (Clean Water and Sanitation) through responsible water management practices across its campus operations. The university receives treated potable water from the municipal provider, Air Selangor, ensuring compliance with national drinking water quality standards. Water consumption is monitored through facility management systems, enabling the university to track usage and promote efficient water management across campus buildings.

Wastewater generated on campus is discharged through the municipal sewerage infrastructure managed by the national sewerage operator, ensuring proper treatment before release to the environment. The university implements operational controls to prevent pollutants from entering the drainage system, including laboratory chemical handling procedures, maintenance of drainage infrastructure and compliance with environmental health and safety regulations.

Free drinking water is provided through water dispensers and refill stations across campus for students, staff and visitors, encouraging hydration and reducing reliance on single-use plastic bottles. Water conservation is also promoted through awareness campaigns and responsible water usage practices within the campus community.

Through these operational measures, UCSI University contributes to sustainable water stewardship and responsible resource management in alignment with SDG 6.



Rain Water Harvesting



Tap Restrictors



Water Dispenser

TEACHING AND LEARNING

1. ECOENACT CSR INITIATIVE | ALGAE FOR FUTURE ENERGY

The ECOENACT CSR Initiative: Algae for Future Energy was a university-organised sustainability programme held on 13 December 2025 at UCSI University Kuala Lumpur Campus, followed by an online technical talk via Microsoft Teams. Organised in collaboration with the Engineers in Society, it was coordinated by Asst Prof Dr V Ramani Bai under Ir Dr Assoc Prof Deprizon Syamsunur. The initiative aimed to raise awareness of algae-based solutions for wastewater treatment, water reuse and renewable energy generation, addressing SDG 6.

The programme enhanced participants' understanding of sustainable wastewater management and environmental innovation, strengthening interest in water purification and bioenergy. The initiative also contributes to SDG 7 and SDG 13 by improving water quality, promoting biofuel production and demonstrating nature-based climate solutions.



2. WELL WATER DIY WATER FILTER KIT

DIY Water Filter Kit was a university-organised initiative held from 11 to 13 August 2025 at UCSI University, supporting SDG 6. The programme aimed to empower students and community members with practical skills to build low-cost water filters, improving water quality and public health while promoting responsible water usage on campus.

The initiative engaged 215 participants, who learned to construct effective DIY filters validated through laboratory testing, demonstrating improved water safety. Knowledge and awareness of safe water practices increased, with nearly all participants intending to apply and share these practices within their communities. Immediate outcomes included enhanced skills, motivation and understanding of water purification. At a broader level, the programme also contributes to SDG 3 and SDG 12 by improving access to clean water, preventing waterborne illnesses and promoting sustainable, resource-efficient solutions.



3. MEMBRANE TECHNOLOGY INNOVATIONS FOR A SUSTAINABLE FUTURE: FROM LAB TO INDUSTRY

Membrane Technology Innovations for a Sustainable Future - From Lab to Industry was a university-organised event held on 29 July 2025 at UCSI University Kuala Lumpur, addressing water scarcity and pollution through advances in membrane technology, supporting SDG 6. The event aimed to share innovative solutions for water desalination, wastewater treatment and haemodialysis membranes, enhancing water quality and accessibility for industrial and healthcare applications.



Key participants included Prof Datuk Ts Dr Ahmad Fauzi Ismail from Universiti Teknologi Malaysia, UCSI president and vice-chancellor Prof Emeritus Datuk Ts Ir Dr Siti Hamisah Tapsir, academics and postgraduate students. The programme increased awareness of advanced membrane technologies and their practical applications. At a broader level, this event also contributes to SDG 9 and SDG 12 by promoting sustainable water management, technological innovation, and efficient, environmentally conscious resource use.



RESEARCH AND DISCOVERY

1. INTEGRATED ULTRAFILTRATION-LIKE FORWARD OSMOSIS AND NANOFILTRATION FOR NATURAL RUBBER SKIM LATEX CONCENTRATION: DEWATERING PERFORMANCE, FOULING MECHANISM, AND ECONOMIC ANALYSIS

(Separation and Purification Technology, (2025) Asst Prof Dr Sum Jing Yao)

Conventional acid coagulation (AC) of natural rubber skim latex (SL) produces hazardous waste like acidic wastewater. Given the sub-micrometer of rubber particles, pressure-driven ultrafiltration (UF) can dewater SL, but hydraulic compaction accelerates fouling. This study replaced conventional dense polyamide forward osmosis (FO) membrane with UF-like FO membrane to boost flux while pressure-less operation eliminates compaction fouling. A nanofiltration (NF) unit then restored the diluted draw solution (DS) for reuse. Using a 15.90 cm² membrane and 300 mL feed, triglycine-crosslinked graphene oxide membrane (triGly-GO/PES-12) achieved a permeate flux of 2.62 L m⁻² h⁻¹. Over 24 h, it reduced the feed volume by 25% and increased the total solids content (TSC) from 6.33% to 10.94%. Compared with unmodified PES-12, triGly-GO/PES-12 showed a lower flux decline ratio (23.43% vs 27.72%) and higher flux recovery (~100% vs 87.39%) after NaOH cleaning, indicating better fouling resistance. Extended Derjaguin-Landau-Verwey-Overbeek (XDLVO) analysis highlighted hydrophobic interactions primarily drive rubber fouling. NF recovered 93% of the DS conductivity and the regenerated DS yielded a comparable permeate flux (3.46 L m⁻² h⁻¹) to fresh DS in subsequent SL filtration. A techno-economic analysis of a 20 m³ day⁻¹ plant estimated specific concentrate production costs (SCPC) of 1.86 \$ m⁻³ for UF-like FO-NF, compared with 3.13 \$ m⁻³ for standalone FO and 8.26 \$ m⁻³ for AC, with DS regeneration reducing costs by 40%. This work showcases UF-like FO-NF integration as a sustainable, cost-effective alternative to conventional SL treatment, supporting sustainable production while reducing environmental impact and improving economic viability.

2. ULTRASOUND TREATMENT OF CHITOSAN MACROBEADS FOR CRACK FORMATION AND APPLICATION IN COLUMN DYNAMICS SORPTION OF METHYL ORANGE

(International Journal of Environmental Science and Technology, (2025) Assoc Prof EUR ING Ir Dr Yeap Swee Pin)

This study aimed to utilize low-cost and environmentally friendly sorbents for removing textile dyes, particularly methyl orange (MO) from wastewater. Here, continuous adsorption experiments were conducted by using chitosan macrobeads (CS-MB) as the low-cost sorbent. The CS-MB was further treated with ultrasonication for crack and pore formation. The physicochemical evaluation revealed that the sonicated beads (CS-SMB) developed a rougher surface with cracks and pores, creating additional adsorption sites. Column studies showed that the optimized process variables for the continuous adsorption of MO onto the CS-SMB are 10 mg/L initial MO concentration, 400 mm bed height, and 20 mL/min flow rate. The MO removal percentage achieved under these optimized conditions slightly outperformed that of the unsonicated beads (i.e. CS-MB). However, the performance of the CS-SMB and CS-MB converged after 10 min probably due to the reduction in bead size and the presence of trapped bubbles within the beads after sonication. Breakthrough curve modeling showed that the adsorption data of CS-SMB most closely fitted the Yoon-Nelson model. This study demonstrates that ultrasonication can effectively modify the structural properties of chitosan macrobeads, thereby altering their dye removal performance.

COMMUNITY AND PARTNERSHIP

1. MEDICAL OUTREACH PROGRAMME 7.0: SUNSCREEN PROTECTION AND BEACH CLEANING

Medical Outreach Programme 7.0: Sunscreen Protection and Beach Cleaning was conducted on 8 November 2025 at a public beach in Port Dickson, organised by MEDICSA. The initiative addressed coastal pollution and its impact on water quality, ecosystems and community well-being, supporting SDG 6. Its objective was to promote pollution prevention, environmental stewardship and public health awareness.

Medical students led beach cleaning efforts and engaged the public on sun protection, including proper sunscreen usage. Immediate outcomes included improved beach cleanliness and heightened public awareness of environmental hygiene and personal health. At a broader level, the programme also contributes to SDG 3 and SDG 12 by protecting water-related ecosystems, promoting UV-related health education and encouraging sustainable waste management and responsible community behaviour.



2. UCSI STUDENTS CONTRIBUTE TO SUSTAINABLE IRRIGATION SYSTEM PROJECT AT MID VALLEY RIVER 3

The Collaborative Sustainable Irrigation Project was organised by UCSI University, involving Mechanical Engineering students alongside collaborators from two other universities. The initiative addressed water wastage in urban green spaces by designing a sensor-based irrigation system to optimise water usage, contributing to SDG 6.

Facilitated in collaboration with ecosystem restoration activist and Alliance of River Three founder, Kennedy Michael, participants developed preliminary designs and practical recommendations for automated irrigation systems using pipelines and soil moisture sensors.

Immediate outcomes of the project included enhanced technical problem-solving skills, a stronger practical understanding of sustainable engineering, and increased awareness of water conservation strategies. At a broader level, the project supports sustainable urban ecosystem management, promotes responsible water use and also contributes to SDG 14 and SDG 15 by improving vegetation care, habitat sustainability and environmental stewardship.

