香港浸會大學 HONG KONG BAPTIST UNIVERSITY

Department of Biology 生物系

Water Sense
KNOWLEDGE. INSIGHT. IMPACT.

Professional Training Program on

Sludge Treatment & Biosolids Management 2026

Advanced Anaerobic Digestion · Dewatering Science & Technology · Sustainable Biosolids Disposal

This advanced MasterClass provides a comprehensive, system-level perspective across the entire wastewater value chain. You will master the origin of solids, the science of dewaterability, technology selection, lifecycle cost analysis, and biosolids utilization. Immersing yourself in these core areas allows you to gain the tools required to address pressing operational challenges and regulatory demands. This MasterClass integrates cutting-edge research with practical calculations and real-world benchmarking, equipping you with the strategic insight to optimize sludge management.

30 Nov & 1 Dec 2026
08:45 – 18:00
Kowloon Tong

Technical MasterClass · Hands-on Calculations · Case Studies · Lab Tour

Utilities · EPCs · Consultants · Policymakers · NGOs · Academia · Students

English

Day 1

1. Setting the Context: Research, Innovation & Real-World Application
2. Journey and Fate of Solids in Sludge Treatment
3. Unlocking Efficiency: The Science Behind Sludge Dewaterability
4. Sludge Pretreatment and Anaerobic digestion

Day 2

5. Hands-On Process Calculations for Sludge Dewatering
6. Strategic Selection of Dewatering Technologies
7. Future Trends & Innovations using Data Science & AI
8. Real-World Problem Discussion with Participants
9. Lab Tour, Closing Remarks

What You Will Learn

- ✓ Understand sludge composition & water fractions
- ✓ Compare treatment processes and their pros & cons
- ✓ Assess impacts of pretreatment & thickening
- ✓ Apply scientific dewaterability concepts in practice
- ✓ Perform hands-on dewatering process calculations
- ✓ Select technologies using performance metrics
- ✓ Analyze lifecycle costs
- ✓ Prepare for future sludge & biosolids management

Training Team

Prof. Nirakar PRADHAN
Associate Professor
Department of Biology
HKBU

Prof. Jun ZHAO
Associate Professor
Department of Biology
HKBU

Dr. Veronica CHAN
Lecturer
Department of Biology
HKBU

Dr. Ashish SAHU
Sr Industry Knowledge Manager in Energy & Environment

Mr. Dinesh GEHANI
Practitioner-strategist in Sludge Dewatering & Biosolids Management

Register Now

Course fee (including refreshments)
Regular: HK$ 5,000
Discounted fee: HK$4,000

- *Early bird registration (on or before 30 Sep 2026)*
- *Members of supporting organisation*
- *Full-time student or HKBU Alumni*
- *Group of 3 or more participants from the same organisation*

Enquiry:
Dr. CHAN (veronica_chan@hkbu.edu.hk)
Prof. PRADHAN (npradhan@hkbu.edu.hk)
Prof. ZHAO (zhaojun@hkbu.edu.hk)

Supporting Organisation

BEAM 建築環保評估協會 · CIBSE Hong Kong · HKGBC 香港綠色建築議會 · HKIQEP 香港環專會

Detailed Learning Curriculum

Module 1 — Setting the Context — Research, Innovation & Real-World Application

Purpose: *Establish the program framework, introduce faculty, and connect participants to real-world scale operations.*

What We Cover

- Introduction to the workshop's objectives, agenda, and trainers.
- An overview of Hong Kong Baptist University's commitment to sustainability and leadership in environmental science and biotechnology research.
- A guided site visit to an organic waste treatment facility to observe the complete process train — from waste reception and pretreatment to digestion, dewatering, and final product/energy generation.
- Introduction of sustainable waste management policy in Hong Kong

Learning Outcomes

Participants will be able to:

- Visualize the real-world scale and complexity of sludge and organic waste treatment processes.
- Identify key unit operations and challenges at a full-scale facility, creating a practical foundation for subsequent technical modules.

Module 2 — Journey and Fate of Solids in Sludge Treatment

Purpose: *Build a fundamental understanding of how solids originate, transform, and behave across the wastewater and sludge treatment process train.*

What We Cover

- The complete journey of solids — from upstream biological and physical treatment processes through sludge handling and conditioning stages. Key characteristics of sludge solids, how they are influenced by upstream unit operations, and why early process decisions critically affect downstream dewatering, stabilization, and disposal outcomes.
- Core unit operations and governing principles defining solids capture, concentration, transformation, and loss across treatment stages. Real-world examples and short case studies connecting theory with operational reality.

Learning Outcomes

Participants will be able to:

- Understand and differentiate sludge characteristics originating from different upstream biological processes.
- Recognize how unit operations influence solids behaviour and downstream performance.
- Relate upstream process decisions to common operational issues in sludge handling and dewatering.
- Apply learnings from short case studies to practical troubleshooting scenarios.

Module 3 — Unlocking Efficiency: The Science Behind Sludge Dewaterability

Purpose: *Build a shared scientific foundation across operators, designers, consultants, EPCs, and policymakers so decisions are science-led — not equipment-led.*

What We Cover

- Sludge dewatering is pivotal in wastewater treatment. This session uses a scientific approach to determine dewaterability and unlock efficiency for sustainable sludge management.
- Sources of sludge & classification: primary, secondary, digested, mixed liquors; industrial vs municipal profiles.
- Sludge matrix & water fractions: free/interstitial/bound water, compressibility, shear sensitivity — why %DS alone can mislead.
- Pretreatment & upstream processes: thickening, digestion, pasteurization, THP — how each shifts dewaterability envelopes and downstream OPEX.
- Scientific approach to predict the maximum achievable sludge dewaterability.

Learning Outcomes

Participants will be able to:

- Explain how sludge origin and pretreatment decisions define achievable dryness, capture rate, and polymer/energy windows.
- Identify upstream levers that reduce lifecycle costs and disposal liabilities.

Module 4 — Sludge Pretreatment and Anaerobic Digestion

Purpose: *Provide a structured understanding of sludge pretreatment and anaerobic digestion technologies — principles, benefits, limitations, and their impact on overall sludge and biosolids management strategies.*

What We Cover

- Overview of conventional and advanced sludge pretreatment technologies - why pretreatment is applied and how it alters sludge characteristics.
- Fundamentals of anaerobic digestion, followed by advanced concepts including enhanced stabilization and energy recovery pathways.
- Design examples and real-world case studies illustrating how pretreatment and digestion choices influence plant performance, stability, and downstream processing. Operational insights and troubleshooting themes bridge theory and practice.

Learning Outcomes

Participants will be able to:

- Compare different sludge pretreatment technologies — principles, advantages, and limitations.
- Understand anaerobic digestion and advanced digestion from principles to operation.
- Evaluate the impact of pretreatment and digestion on sludge quality and downstream processing.
- Learn from practical case studies and typical operational challenges.

About Trainers

Prof. Nirakar PRADHAN

Prof. PRADHAN's research is centred on waste valorization and resource recovery, with specializations in anaerobic digestion, microbial biorefineries for biofuels and bioplastics, and biohydrometallurgy for recovering metals from e-waste. He earned his PhD in Environmental Technology from University Paris-Est, France, and a master's in environmental engineering from the Asian Institute of Technology, Thailand. Prior to his current role, he was a Research Fellow at Nanyang Technological University (NTU), Singapore.

Prof. Jun ZHAO

Prof. ZHAO obtained his Ph.D. from Nanyang Technological University (NTU), Singapore. His research focuses on environmental catalysis and its application in biomass conversion, biowastes utilization, biorefinery, bioenergy and environmental remediation, integrating nanomaterials design with advances in process design to achieve improved conversion. He has been leading research on developing catalysts that can transform solid waste into high-value chemical products, offering sustainable alternatives to fossil fuels. His team is also collaborating with hydrogen-sector companies to scale up its technology from the laboratory to real-life scenarios.

Dr. Veronica CHAN

Dr. CHAN has worked in the fields of environmental-related research and development, consultancy, and training for more than 20 years. She has published over 40 peer-reviewed international journals articles and conference papers, and handled over 100 indoor air quality assessment and certification, and sustainable building assessment projects. Her current research focuses on environmental sustainability and sustainable building assessment and development.

Detailed Learning Curriculum

Module 5 — Hands-On Process Calculations for Sludge Dewatering

Purpose: *Apply scientific concepts to real, plant-ready engineering calculations.*

What We Cover

- Translate sludge dewatering theory into engineering calculations by working through the complete mass balance and solids-loading pathway.
- From raw wet-feed flow and solids concentration, follow the progression through dry solids estimation, cake dryness, and centrate quality — understanding how each parameter affects downstream performance.
- Analysis of energy and polymer consumption; standard benchmarking metrics including kWh/tDS and polymer dose in L/tDS.

Learning Outcomes

Participants will be able to:

- Interpret, normalize, and compare vendor-supplied performance data — identifying unrealistic claims.
- Build defensible mass balance calculations for sludge dewatering systems.

Module 6 — Strategic Selection of Dewatering Technologies

Purpose: *Build a defensible, data-driven technology selection and evaluation framework.*

What We Cover

- A structured exploration of the full spectrum of mechanical dewatering technologies — how each functions, where it performs best, and the operational contexts that shape suitability.
- Key drivers influencing technology selection: feed characteristics, performance expectations, energy footprint, polymer consumption, maintenance philosophy, and long-term lifecycle implications.
- Case studies illustrating how plants navigate technology choices during upgrades, capacity expansions, or compliance-driven transitions.
- Common industry myths around filtration-based technologies — clarifying misconceptions around capture efficiency, reliability, energy requirements, and achievable dryness.

Learning Outcomes

Participants will be able to:

- Build a complete lifecycle cost comparison across dewatering technology options.
- Make objective, data-driven decisions grounded in process science rather than vendor narratives.

Module 7 — Future Trends & Innovations using Data Science & AI

Purpose: *Show how modern design, data science, and AI are reshaping energy efficiency, reliability, and process control in sludge dewatering.*

What We Cover

- Latest design innovations reshaping high-performance centrifugation: deep-pond geometry, soft-stream feed distribution, and energy-optimized drive systems.
- The most persistent industry myths around dewatering and thickening — addressed with evidence.
- Controlled dewatering: one-to-three-dimensional control frameworks progressing to Generative AI and Agentic AI-based process optimization.
- Unique demands of thickening, pre-dewatering, and post-dewatering in new-age sludge pretreatment processes such as thermal hydrolysis (THP) and pasteurization.

Learning Outcomes

Participants will be able to:

- Understand the latest technological developments in dewatering and their implications for plant design and investment.
- Make generation-based decisions informed by future developments

Module 8 — Real-World Problem Discussion with Participants

Purpose: *Consolidate learning through open dialogue, participant-led problem sharing, and applied troubleshooting across all modules.*

What We Cover

- Participants present real or hypothetical plant problems; trainers and peers work through solutions using tools and frameworks from earlier sessions.
- Discussion of thermal treatment pathways and biosolids end-use options: thermal technologies as Best Available Techniques (BAT), land application, resource recovery, and decision frameworks for biosolids reuse vs disposal.
- Short case studies demonstrating how thermal treatment and end-use strategies are implemented under varying regulatory and market conditions.

Learning Outcomes

Participants will be able to:

- Connect module learnings to real operational challenges.
- Evaluate biosolids end-use options including land application and product recovery.
- Leave with actionable takeaways grounded in participants' own plant contexts.

About Trainers

Dr. Ashish SAHU

Dr. SAHU has over 24+ years of experience in the Energy and Environment sector from 3 continents. He completed his Chemical Engineering in India, pursued his PhD from the University of Massachusetts in Civil & Environmental Engineering, and an MBA from UC Berkeley, IFP-Paris & the BI Norwegian Business School in Global Energy. He was a Scientific Researcher at ETH Eawag, Zürich, Switzerland before moving into industry. He has authored over 80 publications in various applications, conference proceedings, and technical reports on water and wastewater treatment technology, and has served as process engineer, senior consultant, technology applications manager, adjunct faculty, and startup advisor.

Mr. Dinesh GEHANI

Mr. GEHANI with over 17 years of experience translating dewaterability science, scaling metrics, and benchmarking into defensible engineering and investment decisions. He advises utilities, industries, and EPCs on technology selection, lifecycle economics, energy efficiency, and risk-informed capacity planning. A marine engineer with an MBA, he brings systems thinking and decision clarity valued by CXOs and policy stakeholders alike. He is a regular speaker at IWA and other global water conferences, and has delivered advanced training programs at leading institutions including the Asian Institute of Technology, National Institute of Hydrology, IIT Roorkee, and IIT Bhubaneswar. He has authored several technical articles on sludge management and dewatering performance.

About Water Sense

Water Sense is a platform for learning and knowledge exchange in the water and wastewater sector. It bridges the gap between research, innovation, and real-world application — delivering advanced training programs, technical publications, and practitioner-led insights to utilities, consultants, EPCs, policymakers, and academia across the Asia-Pacific region and beyond. Operating in association with leading academic institutions, Water Sense designs and delivers programs that combine rigorous science with hands-on engineering practice, helping water professionals build the decision-making capability needed for complex sludge, biosolids, and resource-recovery challenges.