The leading provider of short courses for environment professionals

SYDNEY
12 - 16 February, 2018

COURSES IN

- Principles of Wastewater Treatment
- Biological Nutrient Removal
- Drinking Water Treatment: Principles, Practice and Applications
- Design & Operation of Membrane Systems in Municipal, Mining & Industrial Applications
- Best Practice Drinking Water Quality Management
- Recycled Water Management
- Chemical Contaminants in Water: Significance, Monitoring and Interpretation
- Emerging Chemical Contaminants in Water and Wastewater
- Quantitative Microbial Risk Assessment for Water Safety Management
- Anaerobic Digestion: Sustainable Biosolids Management
- Process Modelling for Water Treatment Professionals
- Pond Design: The Next Generation
- Municipal and Industrial Water Recycling: Membrane Bioreactors Design, Validation and Operation
- Understanding and Managing Air Quality Course (in conjunction with CASANZ)
IWES is the largest and most successful continuing education program for professionals responsible for industry environmental performance in Australia.

Courses are taught by leading industry practitioners and designed to keep busy professionals abreast of the latest trends, technologies and practices.

IWES is the training provider of choice with several large organisations, and we strive to continue to innovate in our course offerings and delivery.

We look forward to continuing to provide a key service for environment industry professionals.
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Principles of Wastewater Treatment

The aim of this course is to teach the key enabling scientific and process engineering fundamentals which underpin wastewater treatment processes. These are taught via real wastewater treatment problems and case studies. This is the most popular wastewater fundamentals course offered in Australia. Now featuring site visits, real case study data and exercises, and state-of-the-art multi-media teaching resources.

ISSUES ADDRESSED

DAY 1
- Wastewater characterisation and sampling
- Primary treatment technologies
- Preliminary treatment and data audits
- Workshop problem 1

DAY 2
- Secondary treatment (aerobic versus anaerobic)
- Biological treatment technologies - ponds, biofilm processes, aeration, high rate anaerobic and aerobic processes
- Plant Visit 1

DAY 3
- Aquatic chemistry - why is pH so important?
- Activated sludge (incl. SBR, MBR, trouble-shooting)
- Workshop problem 2 - Secondary treatment design exercise

DAY 4
- Tertiary treatment - ion exchange, adsorption, membranes, disinfection
- Biosolids Management
- Plant Visit 2

DAY 5
- Water Reuse - municipal and industrial case studies
- Biological Nutrient Removal
- Workshop problem 3

WHAT DO YOU GET?
- Access to a world leading training resource
- Access to world leading practitioners
- USB and hardcopy course notes
- Two half-day plant visits
- Three detailed workshop problem sessions based on real case study material
- Core engineering skills and tools to take back to your workplace, which will enable you to analyse and troubleshoot your wastewater problems
- Real plant data and exercises

WHO SHOULD ATTEND?
Engineers, scientists, managers and new staff who require an excellent introduction to the principles of wastewater treatment.

Go to www.iwes.com.au for the extended course outline
Biological Nutrient Removal

This course teaches the enabling science of biological nutrient removal, and the tools and techniques required to successfully analyse, design and optimise BNR plants. The presenter is one of Australia’s leading BNR process designers, and the course is structured around real-life challenges and solutions encountered in some of Australia’s largest and most demanding BNR projects. This hands-on course focuses on practical exercises and case studies to develop skills that can be applied immediately in the workplace.

ISSUES ADDRESSED

DAY 1  BNR Fundamentals
• Basic bioenergetics - energy, growth and decay
• Wastewater characteristics - how and why sewage is classified
• Sludge age and its influence on design and performance
• Fundamentals of Nitrogen Removal
• Fundamentals of Excess Biological Phosphorus Removal
• Deriving the oxygen demand
• BNR process configurations - fitting to the plants sewage, site, skills and situation
• Demystifying process models for real-world use - managing risks and avoiding pitfalls.

DAY 2  Practical design considerations
• Aeration systems - select, size and specify
• Secondary clarifiers - sizing, configuration and optimisation
• Dissolved oxygen control; settleability and scum management
• Odour considerations
• Design exercise and case studies: Design an actual BNR plant based on specific attributes and requirements, and review against real-world outcomes
• Review of recent BNR plant designs, including real performance data, to understand impacts of design decisions and details
• Plant Visit.

DAY 3  Current and future trends
• Membrane Bioreactors: Development of MBRs; Compare and contrast commercially available MBRs; MBR case studies
• Design exercise: MBR vs Oxidation Ditch
• From Treatment Works to Factory: BNR and production of recycled water, biosolids and energy; Operating costs and considerations; Carbon accounting for BNR
• Innovations in nutrient removal - Deammonification, fixed films, granular sludge and other emerging trends for the next 10 years.

WHAT DO YOU GET?
• USB and hardcopy course notes.

WHO SHOULD ATTEND?
Engineers, technicians and operators with an interest in the design and operation of BNR plants, as well as people with related support functions.

Presenters: David Fligelman
Drinking Water Treatment: Principles, Practice and Applications

The aims of this course are to identify key water quality issues, describe the major water treatment processes currently used, and to outline new approaches for optimising water treatment. This is a practical course, and case studies are used extensively in teaching. The course concludes with an interactive design workshop to consider the issues and required treatment for a theoretical water source and water quality.

ISSUES ADDRESSED

DAY 1

• Overview of the Australian Drinking Water Quality guidelines
• Emerging water quality issues
• Effective water quality management, including case studies
• Disinfection processes and their advantages and disadvantages
• Conventional water treatment technology
• Variations to conventional treatment
• Case studies from operating full scale plants
• Introduction to membrane technology
• Water Treatment Exercise 1

DAY 2

• Causes and treatment of issues related to cyanobacteria
• Treatment options for taste and odour compounds and algal toxins
• Water Treatment plant visit

DAY 3

• Problems relating to inorganic contaminants
• Oxidation and physical processes for removal of arsenic, iron and manganese
• Impact of natural organic matter (NOM) and new approaches to characterise it
• Removal of NOM - optimising coagulation and alternative treatments
• Overview of desalination, including a case study
• Water Treatment Exercise 2

WHAT DO YOU GET?

• Access to world leading experts
• Advice with local issues
• USB and hardcopy course notes
• Relevant publications and websites to seek further information
• Half-day plant visit

WHO SHOULD ATTEND?

The course is designed specifically for engineers, plant operators, scientists, consultants and researchers who do not have a strong background in water quality issues or water treatment processes. It aims to provide an understanding of the issues facing the potable water industry to assist in providing a better water quality outcome.

Go to www.iwes.com.au for the extended course outline

Presenters: David Cook and Jason West

I Mon 12 I Tues 13 I Wed 14 I
Design and Operation of Membrane Systems in Municipal, Mining and Industrial Applications

A selection of courses on design and operation of membrane plants in a range of applications that can be taken as single days or multi-day modules. Each day is self-contained and offers a practical, problem based approach to design and operation of membrane systems in municipal, industrial and mining applications. (Discounts apply for multi-day enrolment, 3-5 day registration options available).

Each module (course day) includes a design problem covering water quality, equipment selection and sizing, data collection and interpretation, operating strategies, trouble shooting and cost estimating.

WHO SHOULD ATTEND?
Anyone who wants to know how to design and operate membrane plants for water and wastewater treatment, water recycling and desalination. The course assumes basic knowledge of water quality and engineering concepts. Participants are encouraged to bring a laptop computer. Numbers will be limited.

ISSUES ADDRESSED

MODULE 1 Design and operation of membrane bioreactors for wastewater treatment
- Comparison of Membrane Bioreactors (MBR) with conventional wastewater treatment
- Equipment selection and sizing calculators for MBRs
- Essential features of balance of plant; head-works, aeration, solids handling and chemical storage
- Operating issues including optimising power consumption and membrane cleaning.

MODULE 2 Design and operation of ultrafiltration and microfiltration systems
- Treatment objectives and basic water quality
- Equipment selection and sizing calculators for microfiltration and ultra-filtration systems
- Development of capital and operating costs
- Operating issues, membrane cleaning & monitoring.

MODULE 3 Design and operation of reverse osmosis or nano-filtration system
- Treatment objectives in municipal, food, pulp and paper and mining applications
- Analysing water quality and using membrane design software for RO and NF
- How to size reverse osmosis equipment
- Operating issues: Normalising and interpreting

MODULE 4 Design and operation of membrane processes in sensitive areas and mining applications
- Treatment objectives for mine water
- How to size equipment including DAF & Ion Exchange
- Operating issues and designs solutions
- Specialist modelling overview for CSG applications
- Equipment sizing and cost estimating.

MODULE 5 Techniques for improving and optimising operational Issues: Process optimisation
- Diagnosing and characterising fouling using membrane autopsy techniques
- Restoring membrane permeability through cleaning
- Options for reducing power consumption
- Developing asset management strategies

WHAT DO YOU GET?
- Select from 2, 3, 4 or full 5 day attendance options
- USB with design software and hardcopy Australian and international case studies
- Q&A with experienced designers and plant operators
- Site visit to full scale plants

Go to www.iwes.com.au for the extended course outline

Presenters: Greg Leslie, Matthew Brannock, Darren Szczepanski
Best Practice Drinking Water Quality Management

This course provides training in best practice drinking water quality management. Taking a practical approach, the course is targeted to those responsible for aspects of drinking water quality management in water utilities and private water suppliers as well as health and economic regulators. This practical course is structured around a series of sessions that begin by explaining concepts using illustrative examples. Each short lecture is followed by small group and individual exercises to provide opportunities for participants to apply concepts to their situations. Case studies of implementation are given using leading edge Australian examples.

ISSUES ADDRESSED

DAY 1

- Context and history of drinking water quality management
- Guiding principles of multiple barrier preventive risk management
- Waterborne disease outbreaks: causes, lessons, trends
- Acute and lifetime exposure guideline values for chemicals
- Pathogen log reduction values
- Sanitary surveys and drinking water source protection
- Matching water treatment technologies to objectives
- Water quality management in distribution systems
- Validation of barriers in-sewer physical, chemical and biological processes.

DAY 2

- Regulation and oversight of water quality management
- Formal requirements and standard of duty
- Water quality risk assessment and management frameworks
- NHMRC/NRMMC Australian Drinking Water Guidelines (ADWG)
- ADWG Framework for Management of Water Quality
- ISO 22000, ISO 9001 and Codex HACCP
- Stakeholders and risk assessment team
- System description and process flow diagrams
- Water quality data analysis and presentation
- Hazard analysis and risk assessment

WHO SHOULD ATTEND?

- Those seeking an understanding of drinking water quality best practice
- Professionals involved in operational, regulatory or service provision roles
- Those developing and implementing drinking water management plans.

WHAT DO YOU GET?

- Comprehensive coverage of drinking water quality management in Australia
- USB and hardcopy course notes
- Access to experienced water quality management practitioners
- Exercises and pro forma's to assist with implementation
- Peer contacts working in water quality management.

Go to www.iwes.com.au for the extended course outline
Recycled Water Management

This course provides training in best practice recycled water management. Taking a practical approach, the course is targeted to those responsible for aspects of recycled water quality and environmental management in water utilities and private water suppliers as well as health and economic regulators. This practical course is structured around a series of sessions that begin by explaining concepts using illustrative examples. Each short lecture is followed by small group and individual exercises to provide opportunities for participants to apply concepts to their situations. Case studies of implementation are given using leading edge Australian examples.

WHO SHOULD ATTEND?

- Those seeking an understanding of recycled water best practice
- Professionals involved in operational, regulatory or service provision roles
- Those developing and implementing recycled water management plans.

Go to www.iwes.com.au for the extended course outline

ISSUES ADDRESSED

DAY 1

- Overview of water recycling in Australia
- Historical context and development of water recycling in Australia
- Overview of recycled water guidelines and approaches
- Recycling of sewage and greywater (Phase 1 guidelines)
- Potable reuse (Phase 2a guidelines)
- Recycling of stormwater (Phase 2b guidelines)
- Managed aquifer recharge (Phase 2c guidelines)
- Recent updates and probable future developments

DAY 2

- Visit to local recycled water treatment plant
- Overview of the AGWR risk management framework
- Related management systems such as ISO 22000 and HACCP
- Commitment, stakeholders & system assessment team
- System description and process flow diagrams
- Data analysis and interpretation

DAY 3

- Environmental targets in water recycling
- Methodologies for hazard analysis and risk assessment risk ranking
- Identifying hazards, assessing risks and setting management priorities
- Identifying preventive measures, critical control points and control programs
- Developing specifications for monitoring and control of risks
- Verification of system performance
- Management of incidents and emergencies
- Supporting programs underpinning the risk management system
- Management plans and regulatory approvals

Presenters: Daniel Deere and Daryl Stevens

Mon 12 | Tues 13 | Wed 14
Chemical Contaminants in Water Significance, Monitoring and Interpretation

This course has been designed to provide the practical skills necessary to commission, manage, interpret and respond to chemical water quality monitoring data. The issues of chemical contaminants in water have rapidly escalated in importance and profile throughout the last decade.

Chemicals including pesticides, dioxins, hormones, pharmaceuticals, cyanobacterial toxins and disinfection by-products have been associated with diverse environmental and public health concerns in drinking water, wastewater and environmental waters. Accordingly, it is increasingly important for water quality practitioners to possess the knowledge and skills to enable them to identify key issues associated with chemical contaminants, design monitoring programs, collect valid samples, select suitable laboratories for analysis and interpret chemical analytical data.

ISSUES ADDRESSED

DAY 1 Understanding the issues
- What types of environmental and human health risks do trace chemicals pose?
- What evidence is there for these risks?
- How are ‘safe’ concentrations and exposure levels determined?
- Australian water quality guidelines and safe levels of exposure
- Analytical methods for extraction and detection
- Learn to speak the language of an analytical chemist!

DAY 2 Fundamentals of advanced chemical analysis & site tour
- Basic principles of advanced analytical methods
- Fundamentals of GC-MS, HPLC-MS, ICP-MS and GC-MS/MS
- Site tour to an analytical laboratory (half day)

DAY 3 Practical skills for chemical water quality monitoring
- Sampling technique to ensure meaningful representative sample collection
- Statistical requirements and minimum sample numbers
- Sample preservation techniques
- Selecting and assessing laboratories for your analysis
- Understanding laboratory techniques to ensure accurate quantitation and quality control
- Interpreting chemical monitoring data
- Statistical analysis and reporting
- Responding to media questions and issues

WHAT DO YOU GET?
- Practical skills to design, manage and interpret chemical water quality monitoring programs
- Access to a national expert in water quality monitoring
- USB and hardcopy course notes
- Several Australian case studies and benchmarking data
- Site visit to an advanced water quality analysis laboratory

WHO SHOULD ATTEND?
This course is designed to enhance the knowledge and skills of people responsible for commissioning, interpreting and responding to chemical water quality monitoring data. It is relevant for people working in catchment management, drinking water quality, wastewater characterisation, environmental water quality and risk assessment.
NEW! Emerging Chemical Contaminants in Water and Wastewater

This 2-day course has been designed in response to IWES feedback indicating a strong interest in emerging water quality issues. Participants will be introduced to a range of high-profile merging contaminants that have presented unique difficulties and concerns for drinking water and wastewater management.

This will include an introduction to the principles of assessing chemical and pathogen risks, which will then be applied to a range of emerging contaminant risk contexts including: novel sanitation systems and reuse, opportunistic pathogens and engineered systems, and climate change.

The material is aimed at raising awareness regarding key issues particular to some of these emerging contaminants. These include potential environmental and public health risks, factors likely to lead to elevated concentrations and treatment process effectiveness.

ISSUES ADDRESSED

DAY 1  Emerging chemical contaminant issues
- PFOS, PFOA and other perfluorinated compounds
- Chlorinated and brominated flame retardants
- Hormones and other endocrine disrupting chemicals
- Pharmaceuticals and personal care products
- Nanoparticles
- Cyanotoxins
- NDMA and other nitrosamines
- Iodinated and brominated disinfection byproducts
- Microplastics.

DAY 2  Emerging microbial contaminant issues
- Assessment of microbial risk
- Assessment of novel urban water systems
- Enteric pathogens (incl. norovirus and Cryptosporidium) and sustainable urban water systems
- Opportunistic pathogens
  - (incl. Legionella spp. and Naegleria fowleri)
- Risk management.

WHAT DO YOU GET?
- USB and hardcopy course notes.

Go to www.iwes.com.au for the extended course outline

WHO SHOULD ATTEND?
Anyone with an interest in updating their knowledge of chemical and microbial water quality contaminants. This includes those responsible for environmental assessment, drinking water and wastewater treatment, laboratory analysis and stakeholder communications.

Presenter: Stuart Khan and Susan Petterson
NEW! Quantitative Microbial Risk Assessment for Water Safety Management

This new 2-day course provides an introduction to Quantitative Microbial Risk Assessment (QMRA), and its application for managing microbial risks in the drinking water, wastewater and recreational water contexts. Participants will be introduced to QMRA as a risk management tool, and provided with a firm practical foundation for understanding the appropriate contexts of application. This course will include an introduction to the four-step process of QMRA aligned with Australian and World Health Organization guidance. More detailed attention will be given to defining an appropriate scope for the risk assessment in consultation with stakeholders; defining the appropriate level of detail for the risk calculations; interpretation of site specific data and international published data for quantifying model inputs; and assessing and communicating the outputs of the analysis.

The material is intended to provide an overview of the important principals and considerations in application of QMRA for risk management. Participants will be equipped with an introductory understanding of the QMRA framework; and with the investigative tools to be able to critique and assess a QMRA study undertaken for them by a consultant.

ISSUES ADDRESSED

DAY 1
- Introduction to QMRA
- QMRA framework and risk management
- Problem formulation: defining the scope and purpose
- Exposure assessment: quantifying the environmental exposure
- Health effects assessment: estimating the health impacts
- Risk characterisation: interpretation of the outcome.

DAY 2
- Application and examples:
  - Several practical examples for group discussion from the drinking water, wastewater and recreational water contexts.
  - Participants are encouraged to BYO case study for discussion during final session.

WHAT DO YOU GET?
- USB and hardcopy course notes.

WHO SHOULD ATTEND?
Anyone interested in gaining an introductory understanding of QMRA either as a first step in undertaking QMRA themselves; or to equip them for evaluating QMRAs undertaken by others.

Go to www.iwes.com.au for the extended course outline

Presenter: Susan Petterson
Anaerobic Digestion: Sustainable Biosolids Management

Anaerobic digestion has emerged as one of the leading methods for biosolids conditioning, as it produces a better quality product, has relatively low cost components, and is well established. As a process, it is well understood, and simple. However, much of this knowledge has not been widely taught, and there is still a perception that anaerobic digestion is a difficult process.

In this course, we dispel this, as well as other myths, and show that anaerobic digestion is a simple, robust process, that is easy to design, operate, and control for a high quality gas and solid product. The course will use spreadsheeting extensively, and participants should bring a laptop computer (with Microsoft Excel installed). Macros should be enabled.

ISSUES ADDRESSED

DAY 1 Background, design, and application
• Biosolids – what are they?
• Guidelines, regulations, quality measures, and the case for beneficial application
• Introduction to biosolids treatment technologies
• Anaerobic digestion: background, design and application
• Enhancing anaerobic systems: use of mechanical and temperature conditioning for better digestion. Economic, technical, and environmental analysis
• Workshop 1: Spreadsheet based analysis of an AD case-study

DAY 2 Body and analysis
• Troubleshooting: What goes wrong with digesters? What impact does it have on quality measures?
• Digester chemistry, including mini workshop
• Overall system design: nutrient, solids, energy and transport management
• Workshop 2: Spreadsheet based analysis of an integrated system

WHAT DO YOU GET?
• Access to an internationally recognised leading researcher and practitioner in Anaerobic Digestion
• Workshop sessions based on real case study material
• Analysis and design skills to take back to your workplace
• USB and hardcopy course notes, including Microsoft Excel spreadsheets

WHO SHOULD ATTEND?
Engineers, managers, consultants and plant operators who are involved in the design, operation and optimisation of anaerobic digestion processes for biosolids management.

Go to www.iwes.com.au for the extended course outline

Presenters: Damien Batstone
**Process Modelling for Water Treatment Professionals**

This is an interactive two-day course built around forecasting water quality and addressing treatment plant performance issues arising from changing feed water conditions. Engineers will learn to understand the influence of water chemistry on process design and how to use this knowledge to optimise performance. Participants will also design new treatment plants and size equipment using comprehensive software that integrates material and heat balancing, equipment sizing, stream property and solubility prediction.

Each module includes realistic scenarios for advanced water treatment applications including boiler feedwater, cooling water blowdown, industrial wastewater, seawater desalination, mine dewatering and brine management.

**Issues Addressed**

**Day 1 Module 1 Water chemistry essentials**
- A comprehensive overview of essential water quality properties for treatment plant design
- Basic theory around chemical equilibrium reaction kinetics and redox potential

**Module 2 Unit operation types**
- An overview of most technologies used in water treatment
- Modes of action defining separation for each technology

**Module 3 Configuring flowsheets for process design**
- Developing a feed water scenario for typical and boundary conditions
- Process design considerations, constraints, performance objectives and assumptions

**Day 2 Module 4 Process modelling for performance optimisation**
- An overview of each unit operation, their key process parameters (design/operational) and how they are used in each model simulate equipment performance
- Learn how to optimise a process design for performance objectives by refining process design parameters for each unit operation.

**Module 5 Process Economics and Lifestyle Evaluation**
- Produce vendor data sheets and RFQ documentation for equipment pricing
- Calculate power, chemical and consumable operating costs
- Estimate turnkey capital costs for a greenfield application

**Module 6 Creating a Process Design or Scenario Modelling Report**
- Documenting the basis of design
- Key elements of a process design report

**What do you get?**
- Free 3 months subscription to AqMB simulation software for water treatment
- USB and hardcopy course notes
- Q&A with experienced designers.

**Who should attend?**

There is an assumed level of knowledge for this course. Please consult the AqMB User Guide if you are uncertain whether your level of experience is adequate. Process engineers, consultants and operators involved in concept design, sizing and/or operation of existing physico-chemical water treatment plants involving conventional (settling, filtration), membrane, resin, electrolytic or thermal technologies.

Go to www.iwes.com.au for the extended course outline
Pond Design: The Next Generation

This course moves pond design principles to a new generation, from simple volumetric sizing, to designs incorporating temperature process equations, non-smelly anaerobic ponds of one day retention, hydraulic design and algae removal in the final effluent. Recent work has shown that ponds are capable of producing a 5:10:5, BOD:SS:NH3 mg/L effluent whilst achieving less than 100 Escherichia coli per 100ml. Learn how to exploit this knowledge for your pond systems. This is a practical course, and participants will undertake design calculations, and work on real pond case studies for both municipal and industrial wastewaters.

ISSUES ADDRESSED

DAY 1
- A short history of ponds
- Why use ponds?
- Different types of pond systems
- The World Bank sewage treatment selection by economics
- The function of different ponds in sewage treatment
- Overview of new pond design guidelines
- Workshop 1: Pond and conventional treatment combinations

DAY 2
- Process design by temperature dependent equations
- Algae removal by tertiary treatment
- Pond hydraulic design parameters including thermistors
- Pond design guidelines
- Site Visit and debrief

DAY 3
- Upgrading existing ponds to meet tight discharge standards
- Pond operation
- Pond monitoring
- Commissioning, desludging and maintenance needs
- Workshop 2: Pond process designs

WHAT DO YOU GET?
- Copy of the Waste Stabilisation Pond Design Manual (2010), developed by John Ashworth for the PWC (NT). This will include an Excel process spreadsheet and engineering drawings
- Case studies in green field pond design
- Case studies for upgrading an existing pond scheme
- Case studies of pond failure – lessons learned
- USB and hardcopy course notes.

WHO SHOULD ATTEND?
Engineers and scientists who need to learn about the next generation of pond design and operation. Project managers who need sufficient knowledge to assess consultants’ recommendations.

Go to www.iwes.com.au for the extended course outline

Presenters: John Ashworth

|     | Mon 12 | Tues 13 | Wed 14 |
This new two-day course will help plant managers and operators plan and implement water recycling systems employing membrane bioreactors (MBR). The course covers features of all commercially available MBR systems, details on estimating size of biological, membrane and ancillary components in municipal and industrial applications. Case studies from municipal, paper and fibre, starch and dairy and agri-processing waste will provide information on typical operating costs and maintenance issues including cleaning and membrane replacement.

The course will also cover regulatory issues, including requirements of Australian Guidelines for Water Recycling and state based requirements for validating pathogen removal and ongoing compliance testing in municipal and food processing applications.

ISSUES ADDRESSED

DAY 1  Planning and designing MBr’s for Municipal and industrial recycling
- Components of recycling scheme
- Summary of national and state regulations
- Feed and product water quality considerations
- Features of commercial MBr’s and developing
  process flow diagram
- Sizing biological, membrane and ancillary
  components

DAY 2
- Contaminant removal mechanisms in MBR systems
- Validation procedures and the science behind the new national validation guidelines
- Selecting surrogate pathogens and developing a validation plan
- System monitoring, membrane integrity and long term water quality
- Effect of membrane cleaning and ageing on system performance

WHAT DO YOU GET?
- USB and hardcopy course notes - including technical paperson case studies
- System sizing spreadsheet for footprint, power and membrane requirements
- Summary of MBR systems available in Australia with reference plant information and data
- Q&A with lead developer of new validation guidelines

WHO SHOULD ATTEND?
Chemists, engineers, planners and operators involved in water and wastewater treatment using membrane processes. the modules are based on recent case studies and developments in membrane equipment. Numbers will be limited.

Go to www.iwes.com.au for the extended course outline

Presenters: Greg Leslie and Pierre Le Clech
Understanding and Managing Air Quality Course (in conjunction with CASANZ)

This NEW two-day course introduces the fundamental aspects of air quality management, including the science behind the behaviour and effects of air pollution. The course covers the principles of air quality and air pollutants and describes how pollutants are assessed through modelling, monitoring and emission inventories. Air quality management is presented and discussed through group exercises and case studies. This course is presented by IWES in conjunction with the Clean Air Society of Australia and New Zealand.

ISSUES ADDRESSED

Introduction
- Air quality and air pollution definition
- Overview of the regulatory framework standard

Introduction to Common Air Pollutants
- Identification of common air pollutants
- Australian and NZ health based standards

Hazardous Air Pollutants
- Definitions, identification and guidelines of hazardous air pollutants.

Fate and Transport
- Describes the factors influencing the outcome of emissions including dispersion, transformation and atmospheric removal processes.

Atmospheric Pollution Modelling
- Basic meteorology parameters and how these relate to air quality.
- Defines air quality models and how they are used
- Model types, advantages and disadvantages
- Model inputs and outputs
- Applications.

Odour, Dust and Amenity
- Odour measurement and management
- Dust measurement and management.

Indoor Air Quality
- Key pollutants and their sources
- Management options.

Global and Trans-Boundary Air Pollution
- Climate change
- Ozone depletion
- Other trans-boundary air pollution issues.

Air Pollution Monitoring
- Monitoring objectives
- Network design and siting
- Equipment maintenance
- Data, quality assurance and reporting
- Monitoring methods.

Estimating Emissions to Air
- Techniques for estimating emissions
- National Pollutant Inventory.

WHO SHOULD ATTEND?

- Local Government or regulatory agency employees managing or working with air quality issues
- Industry, Transport, Mining, Building, Road Construction industry professionals
- Environmental managers, consultants, scientists and engineers requiring an introduction to air quality.

Go to www.iwes.com.au for the extended course outline

Presenters: Janet Peterson

| Thurs 15 | Fri 16 |
Damien Batstone

Dr Damien Batstone is an Associate Professor at the Advanced Water Management Centre, The University of Queensland. Previously, he was an Associate Professor in Environment and Resources, Technical University of Denmark. He has a very strong international presence for his work in a wide range of areas, including industrial wastewater treatment, biofuel production, process optimisation and control, modelling of anaerobic digestion, biosolids treatment and removal of organic pollutants. Damien is an experienced teacher, and he has also consulted extensively in Europe and Australia.

Matthew Brannock

Dr Matthew Brannock has a wealth of experience in water and wastewater plant design and brine characterisation. He is a very capable modeller with extensive experience using chemical speciation and computational fluid dynamic (CFD) models for process simulation both for academic and process design applications. Matthew holds a PhD in Environmental Engineering from The University of Queensland. His research saw him develop CFD tools for the design of wastewater treatment and membrane systems. He has published more than 20 papers in respected journals such as Water Research, Desalination and the Journal of Membrane Science. Following his academic career, Matthew has spent 10 years in the consulting engineering industry specialising in process design of water and brine treatment systems.

Arran Canning

Dr Arran Canning is the Manager, Water Quality and Environment for Seqwater. In addition, he is an Adjunct Fellow at the university of Queensland, department of Civil engineering.

Arran is currently responsible for the overall management of drinking water quality, asset management and environmental management for a very diverse range of water supplies that feed several million people across southeast Queensland through 47 water treatment plants. His role covers most aspects of drinking water quality management, including source protection, treatment and delivery through major distribution systems. Part of this role includes complying with a regulatory requirement to meet the Australian Drinking Water Guidelines (2011) for all systems in the context of the Water Supply (Safety and Reliability) Act 2008 (Qld).

Arran serves in a range of key national roles such as the WSAA Water Quality and Health Committee and the WSAA Health-based Targets Steering Group.
The Presenters

David Cook

David Cook is a Senior Scientist, Water Treatment and Distribution Research, Australian Water Quality Centre, at SA Water Corporation. David has been investigating water quality issues associated with drinking water treatment processes and distribution systems since 1997. Through the participation and management of laboratory and pilot scale projects, David has gained experience in the following areas:

- Natural organic matter removal
- Optimisation of disinfection strategies (chlorination, chloramination and ozonation)

Daniel Deere

Dan Deere is a water quality scientist with Water Futures Pty Ltd, specialising in quantitative and water cycle risk assessment and risk management planning. He also works part-time for the CRC for Water Quality and Treatment as the Catchments Research Program Leader. He has worked in scientific roles in the UK, Sydney and Melbourne as an academic research fellow and consultant, specialising in microbial water quality monitoring and process validation. More recently, he has worked in technical management roles in water utilities in Melbourne and Sydney.

David Fligelman

David is a chemical engineer specialising in the planning, design and optimisation of wastewater and recycled water treatment plants. He has delivered process designs and technical leadership for biological nutrient removal (BNR) systems with a combined treatment capacity of approximately 1,000,000 EP.

Recent projects include the BNR plants at Murrumba Downs, Merrimac, Wacol, and Pimpama. He has an extensive experience in both design and operation of BNR plants.

Dan has provided training in the ADWG Framework, Water Safety Plans (WHO), the Australian Guidelines for Water Recycling Framework and Hazard Analysis and Critical Control Points (HACCP) across Australia, Asia and in Europe. He holds Lead Auditor status and is an Auditor Skill Examiner under the RABQSA Drinking Water Quality Management System (DWQMS) certification scheme.
The Presenters

Stuart Khan

Stuart Khan is a Associate Professor in the School of Civil & Environmental Engineering, University of New South Wales. He leads the research stream on trace organic contaminants in water in the UNSW Water Research Centre. Much of his recent research is focused on the presence and fate of trace chemical contaminants in drinking water, wastewater and recycled water systems. Stuart is also a member of the Water Quality Advisory Committee, appointed by the National Health and Medical Research Council to advise on issues including the rolling revision of the Australian Drinking Water Guidelines. He is an experienced presenter and has taught IWES courses for several years.

Paul Lant

Paul Lant is a Professor within the School of Chemical Engineering at The University of Queensland. He has an international reputation for his research in the field of wastewater treatment. His formal qualifications include a MEng and PhD from Newcastle University (UK) and an MBA from The University of Queensland. He was a co-founder of the Advanced Water Management Centre, the leading water and wastewater R&D group in Australia. Paul is also establishing a reputation as a leading chemical engineering educator, receiving awards for undergraduate teaching and postgraduate supervision innovations. He was a member of teams winning national teaching awards for both undergraduate and postgraduate education in 2005 and 2006. Paul has successfully started up a number of commercial ventures. He is the Founder and a Director of Wastewater Futures Pty Ltd, a wastewater technology company which specialises in wastewater treatment solutions for industrial applications.

Pierre Le Clech

Pierre Le Clech is an Associate Professor at the UNESCO Centre for Membrane Science and Technology at the University of New South Wales. He has been studying membrane processes since 1999, with emphasis on fouling in membrane bioreactors (MBRs). Pierre recently led a team of researchers focusing on the development of guidelines for the validation of MBR for water recycling through the NatVal project funded by the Australian Water Recycling Centre of Excellence (AWRCoE). This work involved intensive sampling of multiple MBR sites and the use of advanced characterization techniques. An important outcome were default performance credits that have been recognised by several state health departments and will be incorporated in national guideline documentation to be finalised by AWRCoE in 2017.

Greg Leslie

Greg Leslie is a Professor of Chemical Engineering and the deputy director of the UNESCO Centre for Membrane Science and Technology at the University of New South Wales. Prior to joining UNSW, he worked in the public and private sector on water treatment, reuse and desalination projects in Australia, New Zealand, Singapore, Hong Kong and the United States. Greg's experience includes work on the Singapore NEWater recycling projects at Bedok, Kranji and Seletar and at the Orange County Water District (OCWD) in California as the deputy programme manager for the Groundwater Water Replenishment System; the largest indirect recharge project in the world. Greg has served on the Water Advisory Committee for the Prime Ministers Science Engineering and Innovation Council (PMSEIC – 2007) the, National Health and Medical Research Council Sub-committee on water issues (2007- 2009), the World Health Organisation Technical Committee preparing guidelines for desalination (2006-2007) and currently serves on the Independent Advisory Panel for the Orange County Groundwater Replenishment Project (2008 - present).
Janet Petersen

Janet Petersen is the President of the Clean Air Society of Australia and New Zealand. Janet is highly experienced in air quality management, including research and monitoring, policy and strategy development. She has lead air quality work for nearly twenty years in a range of organisations such as science, industry, consulting and local government.

Janet convened the National Air Quality Working Group (NAQWG) for four years and has participated in a range of national steering and technical groups for projects such the National Environmental Indicators Programme, the NAQWG Research Strategy, HAPINZ and transport emissions research.

Susan Petterson

Dr Susan Petterson is the Director of Water and Health Pty Ltd and is an international expert in water-related microbial risk assessment. She has been involved with the World Health Organization working group for harmonisation of microbial risk assessment since 2009, and is the lead author of their QMRA guidance document launched in July this year.

Susan serves as an editor for the IWA Journal of Water and Health, and the Global Water Pathogens Project www.waterpathogens.org. She is also a member of the Water Quality Advisory Committee appointed by the National Health and Medical Research Council.

Steven Pratt

Steven is a Lecturer in Chemical Engineering at The University of Queensland. He is a chemical engineer with a PhD in wastewater engineering, and has expertise in industrial wastewater treatment and environmental biotechnology. Prior to working at UQ, Steven worked as a Lecturer in Environmental Engineering at Massey University, New Zealand, where he consulted to local government and the dairy industry on sustainable wastewater treatment, focusing on passive wastewater treatment systems and energy recovery from domestic and agricultural wastes.

Steven is driving a variety of exciting research projects, including producing algal biodiesel and biodegradable polymers from industrial effluents. He is a co-developer of the TOGA Sensor, an innovative high-tech instrument which enables greater insight into biological processes, such as advanced wastewater treatment systems.

Daryl Stevens

Daryl is one of Australia’s leading experts in the use of recycled water in amenity and production horticulture. He is a Principal Scientist with Atura Pty Ltd, and he provides project coordination and scientific services for the Environmental Risk Component of the National Guidelines on Water Recycling, and is the National Coordinator for Recycled Water Development in Horticulture. He was also an advisor to the World Health Organisation.

His research has won several industry and university awards for excellence, and his expertise in the area of recycled water is recognised nationally and internationally. During his research career, Daryl has contributed significantly to more than 100 scientific papers, conference proceedings, technical reports and books. Recently he has been the Senior Editor/author for a book published by CSIRO publishing on ‘Growing crops with reclaimed water’ in Australia.
The Presenters

Darren Szczepanski

Darren has many years of project experience in the field of membrane, resin, electrolytic and thermal technologies within the water, wine and dairy industries. His process design experience includes installations in coal seam gas water, acid mine drainage, seawater, potable drinking water, industrial and municipal tertiary effluent, pharmaceutical, brewery waste, NBC contaminated waste and cooling tower blowdown applications. He has worked on the characterisation of water and brine, developed detailed design and functional specifications, and led the evaluation of complex competing process designs from major thermal technology vendors. Darren holds a Bachelor of Chemical Engineering from The University of Queensland.

Jason West

Jason is a chemical engineer from the University of New South Wales and has worked within the water industry for over twenty-seven years. Most of his experience has been attained within the industrial water sector particularly mining, metals manufacturing and power industry. For the past 11 years Jason has been working at SA Water primarily providing technical support to SA Water’s capital planning, operations and engineering groups the field of water treatment and water quality. Jason’s areas of expertise include conventional water treatment, desalination, membrane filtration and water quality risk management. He now manages a team of nine process and operational support engineers and scientists that provide technical advice to the business so that it can continue to deliver safe and affordable water to over 1.6 million South Australians.

The Venue

Novotel Central

Novotel Sydney Central is located within walking distance of Darling Harbour in Sydney’s bustling CBD, and is conveniently located close to Sydney’s leading entertainment precinct, exhibition venues, and local attractions.

How to book accommodation

IWES delegates qualify for a discounted room rate. Contact us at info@iwes.com.au for details.

Hotel Details

169 - 179 Thomas St, Sydney, NSW
Ph: + 61 2 9281 6888  Fax: + 61 2 9281 6688
What is IWES?

IWES is the largest and most successful continuing education program in Australia for professionals responsible for industry environmental performance.

Our mission is quite simple. It is to provide high quality short course training for environment industry professionals. Courses are taught by leading industry practitioners and designed to keep busy professionals abreast of the latest trends, technologies and practices.

Since 2008 we have run events annually in Sydney, Gold Coast, Melbourne and Perth, and in 2010 we ran our first event in Tasmania. We have averaged 660 delegates per annum through 2007-2016.

Visit our website at www.iwes.com.au where you will find further information on courses and upcoming events.

IWES is owned by The University of Queensland.

WaterAid

WaterAid Australia’s vision is of a world where everyone has access to safe water and effective sanitation.

IWES is a corporate member, and proud supporter, of WaterAid. If you would like to receive more information about WaterAid, including how you can become involved in supporting this very worthwhile cause, please tick the box on the registration form.

WaterAid is an international NGO dedicated exclusively to the provision of safe domestic water, sanitation and hygiene education to the world’s poorest people.

WaterAid works by helping local organisations set up low cost, sustainable projects using appropriate technology that can be managed by the community itself. WaterAid is independent and relies heavily on voluntary support.
The Program

Courses

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<tr>
<th>Course Description</th>
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<td>4 Design &amp; Operation of Membrane Systems</td>
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<td>3, 4, or 5 day attendance options available.</td>
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<td>8 NEW! Emerging Chemical Contaminants in Water and Wastewater</td>
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<td>9 NEW! Quantitative Microbial Risk Assessment for Water Safety Management</td>
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<td>13 Municipal and Industrial Water Recycling</td>
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<td>14 Understanding and Managing Air Quality Course (in conjunction with CASANZ)</td>
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What do people say about IWES?

“Excellent course, principles explained in a comprehensive manner. A lot of material covered - good breadth and good depth as well - latest technologies also introduced.”

“Great subject matter, appropriate level of complexity that was well presented and explained. Good notes, broken in sections appropriately. Good mix of theory and practical. Great site visits to break things up - Great food, good venue with good facilities and access to public transport. All round worthwhile.”

“Content covered at a good pace. - A good number of breaks during the day - excellent responses to questions – with the right level of complexity, excellent slides, excellent content.”

“Presenter was extremely knowledgeable and shared material concisely and clearly. I left the course feeling inspired rather than bored, baffled or disappointed. Good combination of theory and application.”

“Fantastic overview of so many different areas of wastewater treatment. The course linked both real life problems with theoretical concepts.”
Please select your course/s and complete the registration form in full. Please note, one registration form per person is required. Forward your completed form to info@iwes.com.au, we will respond to confirm your details asap.

Please register me for these courses

No. of days

1. Principles of Wastewater Treatment 5 days
2. Biological Nutrient Removal 3 days
3. Drinking Water Treatment: Principles, Practice and Applications 3 days
4. Design & Operation of Membrane Systems
   Select 3, 4 or 5 days from Modules:  
   1  2  3  4  5
5. Best Practice Drinking Water Quality Management 2 days
6. Recycled Water Management 3 days
7. Chemical Contaminants in Water: Significance, Monitoring and Interpretation 3 days
8. Emerging Chemical Contaminants in Water and Wastewater 2 days
9. Quantitative Microbial Risk Assessment for Water Safety Management 2 days
10. Anaerobic Digestion: Sustainable Biosolids Management 2 days
11. Process Modelling for Water Treatment Professionals 2 days
12. Pond Design: The Next Generation 2 days
13. Municipal and Industrial Water Recycling with Membrane Bioreactors Design, Validation and Operation 2 days
14. Understanding and Managing Air Quality Course (in conjunction with CASANZ) 2 days

Cost of Registration (inc.GST)

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Discounts for organisations registering multiple delegates

- 2 - 3 delegates = 5%
- 4 - 5 delegates = 10%
- 6 and over = 15%

All registrations are attached to confirm this discount as per Item 3 in the ‘terms and conditions’

Registration Details

Dr  Mr  Mrs  Ms  First name  Last name
Organisation  Address
Phone  Email

☐ I have dietary requirements. Details

☐ Please add my contact details to the IWES enews so I can receive updates on upcoming events.

☐ Please send me more information on WaterAid Australia.

Send completed form to IWES by Email: info@iwes.com.au  UQ ABN: 63 942 912 684

TERMS AND CONDITIONS

1. Cancellation of registration less than 3 weeks before the starting date of a course(s) will incur a cancellation fee of 50% of the course price. Alternatively, delegates may send a substitute. 2. While every attempt will be made to deliver all advertised courses, IWES reserves the right to cancel individual courses at short notice. 3. Only registrations submitted and invoiced in one batch qualify for multiple registration discounts.