Nutrient Removal Engineering: Phosphorus and Nitrogen in Wastewater Treatment

April 26–28, 2011
Madison, Wisconsin

A valuable course for

- Engineers
- Plant superintendents
- Consultants
- O&M professionals
- Federal agency staff
- Anyone who wants to learn more about nutrient removal engineering

Save time and money! Inquire about on-site & online courses. Call 800-462-0876 today!

Please route this brochure to colleagues who would also benefit by attending.

Nutrient Removal Engineering: Phosphorus and Nitrogen in Wastewater Treatment

April 26–28, 2011
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Taught by leading national professionals, this course will help you understand the processes, regulations, and applications in the important field of nutrient removal engineering.
Nutrient Removal Engineering: Phosphorus and Nitrogen in Wastewater Treatment
April 26–28, 2011 in Madison, Wisconsin

Join Us for this Valuable Course
Phosphorus and nitrogen are significant issues for today's wastewater treatment engineers, managers, consultants, and regulators. With new or revised regulations and discharge permits, many treatment plants need to further reduce the discharge of effluent nutrients to surface waters to help prevent excessive growth of algae and other aquatic vegetation. New technologies for beneficial recovery of nutrients are also areas of growing interest. This course, led by nationally known professionals, will combine useful fundamentals together with regulations, practical guidance and technologies to provide a thorough knowledge base in this important field.

Who Should Attend
The course is designed for
- Engineers
- Plant superintendents
- Consultants
- O&M professionals
- Federal agency staff
- Anyone who wants to learn more about nutrient removal engineering in wastewater treatment

Topics Include…
- Current regulations for phosphorus and nitrogen—national and regional issues
- Fundamentals and basic principles for phosphorus and nitrogen removal
- Technical options for retrofitting wastewater treatment plants
- Cost and operating considerations for the different processes
- Pollutant trading—point source and non-point sources
- Technologies for nutrient recovery and beneficial reuse
- Case studies and examples of nutrient removal experiences
- Class exercises and workshop scenarios
- Practical expertise and guidance from across the country

About Your Instructors

Henryk Melcer PhD, PE is the Northwest Regional Process Engineer for Brown & Caldwell Consultants. Dr. Melcer has more than 30 years of experience and is widely known for his work in biological wastewater treatment processes. His extensive experience includes applied research, pilot scale development and full-scale process application. Prior to joining Brown and Caldwell, he served with Environment Canada's Wastewater Technology Center. He is the author of numerous publications including the book Methods for Wastewater Characterization in Activated Sludge Modeling.

Art Umble PhD, PE is the national Director of Process Engineering with Greeley and Hansen, LLC. Dr. Umble has more than 20 years of wastewater experience and has previously served as manager of operations for the City of Elkhart, Indiana, and as Adjunct Professor of Civil Engineering at the University of Notre Dame. He has authored and presented numerous papers at regional and national conferences, and he serves as national vice-chair of the Municipal Wastewater Treatment and Design Committee for the Water Environment Federation.

James Banaszak, PhD, is the Chief Technology Officer with OpenCEL, LLC, an environmental biotechnology company based in Glencoe, IL. Dr. Banaszak has more than 25 years of experience in pilot, startup, and full-scale industrial operations, process engineering, and technical business development. Prior to his work at OpenCEL, Dr. Banaszak provided scientific and engineering consulting as the Director of the Chicago office of Exponent, Inc., and as a manager with McKinsey and Company.

Jim Baumann is special assistant in the Wisconsin Department of Natural Resources' Bureau of Watershed Management. Mr. Baumann has more than 25 years of experience in environmental management, and he serves as contact person for the recent revisions to the State of Wisconsin's phosphorus regulations. His experience has included permitting of wastewater treatment plants and the management of nutrients from both point sources and non-point sources.

Ned Paschke, PE directs water and wastewater engineering and management programs for the University of Wisconsin–Madison. Prior to joining the university, he served as Director of Engineering for the Madison Metropolitan Sewerage District, as a senior water and wastewater consultant with Mead & Hunt, Inc., and as a member of the hydraulic analysis group at Harza Engineering Company (now MWH Global), Chicago. He has more than 25 years of experience in design and management of water-related facilities.

Useful Take-home Reference
Course attendees will receive a binder of detailed course notes and presentation materials.

Why Attend a Course from UW–Madison Engineering Professional Development?
- Helpful instructors with outstanding experience
- Class sizes that allow for extensive interaction, questions, and discussions—ideal for learning
- Detailed course notebook, luncheons, refreshments and completion certificate—all included
- Professional programs organized by one of the nation's largest providers of continuing education

See detailed course agenda inside.

ENROLL ONLINE TODAY! Or visit our Web site
Course Outline

Tuesday, April 26
7:30 Registration and Refreshments
The Pyle Center
702 Langdon Street
Madison, Wisconsin

8:00 Welcome and Introductions
Ned Paschke, Program Director
University of Wisconsin–Madison

8:15 An Overview of Nutrients and Nutrient Removal – Henryk Melcer
- Why are nutrients an issue?
- Nitrogen and phosphorus cycles
- Challenges for today’s treatment plants

9:20 Break

9:40 Nutrient Treatment Fundamentals – Henryk Melcer
- Fundamentals of nitrification
- Raw wastewater characteristics
- Fundamentals of biological selectors
- Fundamentals of denitrification, biological phosphorous removal
- Sludge settling characteristics
- Biological reactor concepts
- Fundamentals of chemical phosphorus removal
- Integration of chemical and biological treatment

10:45 Break

11:00 Nutrient Regulations and Regulatory Trends – Jim Baumann
- Relationships to the Clean Water Act
- Discharge permits and the evolution of nutrient control
- Technology-based, water-quality based, region specific criteria
- Similarities and differences across the EPA regions and states
- The role of MS4

12:00 Lunch (provided) and Conversation

1:00 Continued - Nutrient Regulations and Regulatory Trends – Jim Baumann
- Regional and water body specific TMDLs
- Watershed permitting, nutrient trading
- Impacts of regulation on capital and O&M costs

2:00 Break

2:20 Technologies for Nutrient Removal - Art Umble
- Nitrogen removal
  - Conventional nitrification
  - Wuhrmann process
  - Ludzak-Edinger processes
  - 4-stage Bardenpho processes
- Biological phosphorous removal
  - A/O process
  - Biological nitrogen and phosphorus removal

3:00 Break

3:20 Application of Process Models in BNR Design – Art Umble
- Process modeling fundamentals
- Parameter sensitivities for BNR performance
  - Temperature, alkalinity, degradable carbon, SRT, RAS, mixed liquor recycle rates, recycle streams
  - BNR wet weather treatment performance

3:40 Nutrient Removal Case Studies and Discussion – Art Umble and Henryk Melcer

4:30 Adjourn for the Day

Wednesday, April 27, 2011
7:30 Coffee, Conversation, Refreshments

8:00 Technologies for Nutrient Removal (Continued) – Art Umble
- IFAS/MMBR, FBBR, MBR
- Denitrification
- Filtration, SND, Reverse Osmosis

9:10 Break

9:30 Sidestream Treatment Technologies – Henryk Melcer
- Ammonia stripping
- Struvite precipitation
- Sharon / Anammox / Demon processes

12:00 Lunch (provided) and Conversation

1:00 Retrofitting Today’s Plant for Tomorrow’s Nutrient Removal Technology - Art Umble, with Jim Banaszak
- Converting the conventional activated sludge plant to BNR
- Converting the conventional activated sludge with nitrification plant to BNR
- Impacts on bioreactor volume, equipment, and complexity of controls
- Costs and cost trends for nutrient removal

2:00 Break

2:20 Discussion – Art Umble and Henryk Melcer

3:40 Nutrient Removal Case Studies and Discussion – Art Umble and Henryk Melcer

4:30 Adjourn for the Day

Thursday, April 28, 2011
7:30 Coffee, Conversation, Refreshments

8:00 What is the Future for Nutrient Treatment and Control? – Jim Banaszak
- Whole plant influence on nutrient removal performance
  - The “ultimate” removal limits
  - Impact of solids treatment and handling on nutrient loading
  - Supplemental carbon sources, fermentation of primary sludge, external carbon sources, common chemical carbon, industrial waste carbon (brewery, dairy, soft drink, etc.)
- Alternative future technology approaches
  - Sidestream bioaugmentation, anaerobic systems, new plant flow sheets, source separation

9:10 Break

9:30 Nutrient Resource Recovery – Jim Banaszak
- Why less focus on recovering nitrogen?
- Global phosphate depletion
- Phosphorus recovery, controlled struvite precipitation, algal production/harvesting, nutrient recycling

10:40 Break

11:00 Nutrient Big Picture Issues – Jim Banaszak
- Impacts of nutrient removal on energy demand
- Impacts of nutrient removal on GHG emissions and carbon footprint
- Role of climate change and variability on nutrient removal performance
- Role of “green” infrastructure on nutrient removal technology
- Nutrient trading
- Localized nutrient shortages

12:00 Lunch (provided) and Conversation

1:00 Tour of Nutrient Removal Facilities at the Madison Metropolitan Sewerage District
- Class attendees are invited to tour the nutrient removal facilities at MMSD’s Nine Springs Wastewater Treatment Plant. Transportation to and from the plant is provided.

3:00 Final Adjournment

Note: Some adjustment of individual timeslots and topic segments may occur during the course.

ENROLL ONLINE TODAY! Or visit our Web site
Course Information

- Please enroll me in Nutrient Removal Engineering: Phosphorus and Nitrogen in Wastewater Treatment
  - Course #M590 April 26-28, 2011 in Madison, Wisconsin  Fee: $1,125
  - Fee Discount: Save $100 each when you enroll by March 26.
  - Discounted enrollment fee: $1,025 each
- I cannot attend at this time. Please send me brochures on future courses.

Personal Information (Please print clearly.)

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Need to Know More?

Call toll free 800-462-0876 and ask for
Program Director: Ned W. Paschke, PE
Direct 608-263-4705 paschke@engr.wisc.edu
Program Associate: Gail Geib Direct 608-262-5566
ggeib@engr.wisc.edu

General Information

Fee Covers instruction, notebook, course materials, break refreshments, luncheons, and certificate. Course materials are distributed only to course participants.

Cancellation If you cannot attend, please notify us by April 19, and we will refund your fee. Cancellations received after that date and no-shows are subject to a $150 administrative fee. You may enroll a substitute at any time before the course starts.

Course Location The Pyle Center, 702 Langdon Street, Madison, Wisconsin, 53706. Telephone 608-262-1122.

Hotel Rooms We have reserved a block of sleeping rooms ($112/single, including parking and Madison taxi's silver cab from the airport) for course participants at the Campus Inn, 601 Langdon Street, Madison, WI. To reserve a room, call 800-589-6285 or 608-257-4391 and indicate that you will be attending this course under group code 107137. Room requests made later than April 4 will be subject to availability. We have reserved a second block of sleeping rooms ($89/single; $99/double, including parking, continental breakfast, pool and exercise room) for course participants at the Lowell Center, 610 Langdon Street, Madison, WI. To reserve a room, call 866-301-1753 or 608-256-2621 and indicate that you will be attending this course under group code M590/NREWT; password LOWELL. Room requests made later than March 28 will be subject to availability. Your enrollment confirmation will include other hotel/motel information.

Enjoy Your Visit to Our Campus!

The course will be held at The Pyle Center, 702 Langdon Street, Madison, Wisconsin. This modern conference facility, immediately adjacent to Lake Mendota, is located in the heart of one of the world's great university settings. In your spare time, you may wish to explore the beautiful University of Wisconsin campus, hike to Picnic Point along the Lakeshore Path, relax at the Memorial Union Terrace, or enjoy the shops and restaurants of State Street, just a block away.

Other Courses of Interest

Visit our website at http://epd.engr.wisc.edu for complete listings and details.

Upgrading Your Sanitary Sewer Maintenance Program
February 28–March 1, 2011, Virginia Beach, VA
Course #M483
March 21–22, 2011, Madison, WI
Course #M409

Wastewater Pumping Systems and Lift Stations
March 2–4, 2011, Virginia Beach, VA
Course #M482
March 23–25, 2011, Madison, WI
Course #L175

Understanding Water Chemistry for Practical Application
March 8–9, 2011, Madison, WI
Course #L601

Introduction to Environmental Engineering with Green Applications
March 10–11, 2011, Madison, WI
Course #L600

Municipal Drinking Water Distribution System Engineering
April 5–7, 2011, Madison, WI
Course #M599

Pumps and Motors
April 12–14, 2011, Madison, WI
Course #L599

Fundamentals of Drinking Water Treatment
May 17–19, 2011, Madison, WI
Course #M507