

THT 311 - 2021

Water Resources Management and Water & wastewater treatment (Special topics)

Time: 14th-28th June 2021

Course contents

This course is an intensive course complimentary to THT 271, THT 310 or can be taken as an independent professional development course.

This course focuses on thematic modules addressing the modern water and wastewater management:

- Global water challenges
- Integrated Water Resource Management
- Climate change impacts on water sector
- Water Quality Management
- Water quality monitoring
- Bioeconomy
- Digitalisation of the water sector
- Cybersecurity in the water sector
- Decentralised wastewater treatment
- Emerging water challenges
- Research skills for the water sector

Course assignments will focus on implementation of one or more special topics in a water utility upgrading.

Learning outcome

After completion of this course, graduates will be able to:

- apply principles of the integrated water resource management
- recognise climate change impacts on water sector
- explain principles, opportunities and risks of digitalisation in the water sector
- implement bioeconomy principles in the water sector
- compare decentralised and centralised wastewater treatment solutions
- explain emerging water challenges
- develop research concepts and present results

Learning activities

(1) Lectures (2) group work in small teams, (3) Tutorials with process simulation program STOAT, (4) instructions and hands-on practice in usage of scientific databases and reporting. Most of the presentations will be available in Canvas before the lectures

Lecturers:

Course responsible	Harsha Ratnaweera (HR)
Lecturers from RealTek	Lars Hem (LH), Zakhar Maletskyi (ZM), Pelin Schumacher (PS)
Guest lecturers	Haakon Thaulow (THT), Nataly Sivchenko (NS), Abhilash Nair (AN)
Exam (tbc)	Digital exam ("Open book")

Curriculum:

- Powerpoint presentations and hand-outs from lecturers (available in Canvas)
- Additional information given orally at the physical lectures or zoom lectures
- Selected publications stored in Canvas.

Reference literature:

- Kemira: [About Water treatment](#), 2020 (pdf in Canvas)
- Wastewater Engineering: Treatment and Resource Recovery. 5th Ed, by Metcalf & Eddy, 2013, (selected sections).
- Water Treatment: Principles and Design, 3rd Edition, MWH, 2012 (selected sections)

Term paper

- There will be one project work.
- Detailed tasks will be presented at the beginning of the course. A report of about 5000-7000 words (15-20 pages including figures) is expected.
- Individual submissions only (no group submissions). More information will be provided with the task description.

Language:

- All lectures and handouts will be in English,
- Exam questions, term paper descriptions etc will be provided only in English.
- Project work could be provided either in English or Norwegian.

NB: The lecture plan could be changed – please follow the information in Canvas

Introductory revision sessions for Eurasia students

Saturday 12th June: Water supply Revision		UA, BY, MD	KG	TJ, KZ
Course introduction (Ratnaweera)	08:00-08:15	09:00-09:15	12:00-12:15	11:00-11:15
Needs, challenges and legislations: EU and WHO (Hem)	08:15-09:00	09:15-10:00	12:15-13:00	11:15-12:00
Drinking water quality: sources, parameters, principles of monitoring (Maletskyi)	09:15-10:00	10:15-11:00	13:15-14:00	12:15-13:00
Separation: sedimentation and flotation (Ratnaweera)	10:15-10:45	11:15-11:45	14:15-14:45	13:15-13:45
Separation: Surface, depth and membranes (Maletskyi)	10:45-11:15	11:45-12:15	14:45-15:15	13:45-14:15
Coagulation, Corrosion control Disinfection and NOM removal (Hem)	11:30-12:30	12:30-13:30	15:30-16:30	14:30-15:30
Discussion time (voluntary- teachers will be present)	13:00-14:00	14:00-15:00	17:00-18:00	16:00-17:00
Sunday 13th June: Wastewater Revision				
Needs, challenges and legislation: EU and WHO (Ratnaweera)	08:00-08:45	09:00-09:45	12:00-12:15	11:00-11:15
Wastewater quality: sources, parameters, principles of monitoring (Maletskyi)	09:00-09:45	10:00-10:45	13:00-13:45	12:00-12:45
Physical methods and application (Maletskyi)	10:00-10:30	11:00-11:30	14:00-14:30	13:00-13:30
Chemical methods and application (Ratnaweera)	10:30-11:15	11:30-12:15	14:30-15:15	13:30-14:15
Biological methods and application (Hem)	11:30-12:30	12:30-13:30	15:30-16:30	14:30-15:30
Discussion time (voluntary- teachers will be present)	13:00-14:00	14:00-15:00	17:00-18:00	16:00-17:00

THT 311 – 2021

Water Resources Management and Water & wastewater treatment: Special topics

Time: 14th-25th June 2021

Monday 14th June		UA, BY, MD	KG	TJ, KZ
Course introduction (Ratnaweera) and group work structure	08:00-08:30	09:00-09:30	12:00	11:00-11:30
Module 1: Meeting the global challenges in the water sector				
Global challenges (Thaulow)	08:30-10:30	09:30-11:30	12:30-14:30	11:30-13:30
Meeting challenges in the water sector: Climate Change (Ratnaweera)	10:45-11:30	11:45-12:30	14:45-15:30	13:45-14:30
Group work: Groupmap exercise (Maletskyi)	12:00-14:00	13:00-14:00	16:00-18:00	15:00-17:00
Tuesday 15th June				
Module 2: Integrated water resources management & Water quality (Vermaat)	08:00-11:00	09:00-12:00	12:00-15:00	11:00-14:00
Groupwork (Playing serious game SIM4NEXUS) (Maletskyi)	11:30-14:00	12:30-15:00	15:30-18:00	14:30-17:00
Wednesday 16th June				
Module 3: Planning of water utilities for the future (Hem)	08:00-11:00	09:00-12:00	12:00-15:00	11:00-14:00
Groupwork (Playing serious game on Adaptive Planning) (Maletskyi)	11:30-14:00	12:30-15:00	15:30-18:00	14:30-17:00
Thursday 17th June				
Module 4: Water quality monitoring				
Sampling and online monitoring (Ratnaweera)	08:00-09:30	09:00-10:30	12:00-13:30	11:00-12:30
Advanced methods (Maletskyi)	09:45-11:00	10:45-12:00	13:45-15:00	12:45-14:00
Groupwork on water quality: designing a monitoring plan for a DWTP/WWTP (Ratnaweera)	11:30-14:00	12:30-15:00	15:30-18:00	14:30-17:00
Friday 18th June				
Module 5: Digitalisation of the water sector				
Opportunities and threats (Ratnaweera)	08:00-08:45	09:00-09:45	12:00-12:45	11:00-11:45
Introduction to simulation programs in the water sector (Ratnaweera)	09:00-09:30	10:00-10:30	13:00-13:30	12:00-12:30
Simulation program STOAT (Sivchenko)	09:45-11:30	10:45-12:30	13:45-15:30	12:45-14:30
Hands-on training on STOAT (Sivchenko)	12:00-14:00	13:00-15:00	16:00-18:00	15:00-17:00
Monday 21st June				
Module 6: Bioeconomy (Schumacher)	08:00-11:00	09:00-12:00	12:00-15:00	11:00-14:00
Group work: discuss and prepare a PPT presentation on given topics	11:30-13:00	12:30-14:00	15:30-16:00	14:30-16:00
Presentation in plenum (Pelin)	13:00-14:00	14:00-15:00	17:00-18:00	16:00-17:00
Tuesday 22nd June				
Module 7: Research skills and visibility				

Research publication writing (Ratnaweera)	08:00-08:45	09:00-09:45	12:00-12:45	11:00-11:45
Increasing visibility: ResearchGate, Google Scholas, Scopus, LinkedIn etc (Maletskyi)	09:00-10:00	10:00-11:00	13:00-14:00	12:00-13:00
Managing scientific references – Mendeley and data bases (Sivchenko)	10:00-11:00	11:00-12:00	14:00-15:00	13:00-14:00
Group work: Hands-on literature search (Sivchenko)	11:30-14:00	12:30-15:00	15:30-18:00	14:30-17:00
Wednesday 23rd June				
Module 6: Digital tools in water utilities				
BIM and digital twins (Nair)	08:00-09:45	09:00-10:45	12:00-13:45	11:00-12:45
Virtual visit to a treatment plant (Ratnaweera)	10:00-11:00	11:00-12:00	14:00-15:00	13:00-14:00
Groupwork: design a treatment plant with videos from internet (Ratnaweera)				
Thursday 24th June				
Module 9: Decentralised water management and Eco Sanitation (Heistad)	08:00-11:00	09:00-12:00	12:00-15:00	11:00-14:00
Group work: discuss and prepare a PPT presentation on given topics	11:30-13:00	12:30-14:00	15:30-17:00	14:30-16:00
Presentation in plenum (Heistad)	13:00-14:00	14:00-15:00	17:00-18:00	16:00-17:00
Friday 25th June				
Emerging water challenges (Maletskyi)	08:00-10:00	09:00-11:00	12:00-14:00	11:00-13:00
Exam & discussion of question/answers	11:00-12:30	12:00-13:30	14:00-16:30	13:00-15:30
Closure	12:30	13:30	16:30	15:30