Course syllabus

Avancerad avloppsvattenhantering
Advanced Wastewater Treatment

VVAN20, 7,5 credits, A (Second Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED B/K
Date of Decision: 2023-04-18

General Information

Main field: Water Resources Engineering.
Elective for: K4, MWLU1, V4-vr, W4-vr
Language of instruction: The course will be given in English

Aim

Future effluent requirements on wastewater treatment will be more stringent regarding nutrients as well as various micropollutants. At the same time there are high expectations on space- and energy efficient solutions.

The aim of the course is to:

- provide in-depth knowledge of principles and methods for mechanical, biological and chemical wastewater treatment
- provide tools to apply in selection and design of advanced wastewater treatment systems.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- be able to suggest suitable treatment technologies for a wastewater stream with given prerquisites in terms of hydraulic loading, pollutant loading and effluent requirements.

Competences and skills
For a passing grade the student must

based on given prerequisites and for municipal wastewater be able to:

- design activated sludge processes and biofilm processes
- design tertiary treatment processes
- design sludge handling systems
- to provide principle designs for removal and degradation of micropollutants
- orally and in writing present an advanced system for wastewater treatment to other students.
- critically examine scientific papers within certain fields of wastewater treatment.

Judgement and approach
For a passing grade the student must

- be able to assess advantages and disadvantages connected to various (selected) treatment processes based on consequences on effluent water quality, foot-print, energy efficiency and handling of bio solids.

Contents

- The design process - data evaluation and process selection
- The activated sludge process - princippples and design
- Biofilm processes - principles and design
- Tertiary treatment - principles and design
- Membrane bioreactors and direct membrane filtration of raw wastewater
- Alternative nitrogen removal
- Sludge handling and anaerobic digestion - principles and design
- Removal of micropollutants
- Source sorting
- Urban infrstructure and stormwater treatment

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Written examination. Oral and written presentation of project work.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Parts
Code: 0117. **Name:** Examination 1.
Credits: 1,5. **Grading scale:** UG. **Assessment:** Written examination
Code: 0217. **Name:** Examination 2.
Credits: 1,5. **Grading scale:** UG. **Assessment:** Written examination
Code: 0317. **Name:** Project Work.
Credits: 4,5. **Grading scale:** TH. **Assessment:** Oral and written presentation of project work

Admission

Admission requirements:

- VVAN05 Urban Waters, Part 117 Urban Water (Examination 1). or VVAN25 Water and wastewater treatment, Part 0120 Water and Wastewater Treatment

The number of participants is limited to: No
The course overlaps following course/s: KBTF10

Reading list

- Mackenzie L. Davis: Water and wastewater engineering, Design Principles and Practice. McGraw-Hill Education, 2010, ISBN: 978-0-07-171384-9.
- Scientific papers, supplementary material.

Contact and other information

Course coordinator: Michael Cimbritz, michael.cimbritz@chemeng.lth.se
Course homepage: https://www.ple.lth.se/en/