



Wastewater Treatment Technology (I001935)

Cursusomvang (nominale waarden; effectieve waarden kunnen verschillen per opleiding)

Studiepunten 6.0 Studietijd 180 u Contacturen 90.0 u

Aanbodssessies en werkvormen in academiejaar 2019-2020

A (semester 1)	Engels	practicum	30.0 u
		zelfstandig werk	5.0 u
		werkcollege: geleide oefeningen	30.0 u
		hoorcollege	25.0 u

Lesgevers in academiejaar 2019-2020

Rabaey, Korneel	LA25	Verantwoordelijk lesgever
Vanoppen, Marjolein	LA24	Medelesgever
Verliefde, Arne	LA24	Medelesgever
Vlaeminck, Siegfried	UA	Medelesgever

Aangeboden in onderstaande opleidingen in 2019-2020

	stptn	aanbodssessie
Master of Science in Technology for Integrated Water Management	6	A

Onderwijstalen

Engels

Trefwoorden

Environmental technology, environmental sanitation, wastewater engineering, microbiology, policy

Situering

Inhoud

Part A: Physico-chemical methods for water and wastewater treatment

- 1 Pretreatment
- 2 Coagulation and flocculation
- 3 Membrane techniques and reuse
- 4 Remaining concerns regarding the ecotoxicological risk of effluents and sludge

Part B: Biotechnological methods for water treatment

- 1 Wastewater treatment
 - 1.1 What is wastewater?
 - 1.2 Legislative framework for wastewater treatment
 - 1.3 Wastewater treatment approach
- 2 Activated sludge
 - 2.1 General overview of this chapter
 - 2.2 General and historical
 - 2.3 Definition of parameters and terms
 - 2.4 Process design and biokinetics
 - 2.5 Nutrient removal
 - 2.6 Aeration
 - 2.7 Sludge sedimentation
 - 2.8 Control, modeling and automation
 - 2.9 Microbial ecology of the activated sludge process
 - 2.10 Flocculation of activated sludge
- 3 Special types of activated sludge processes

- 3.1 Sequencing Batch Reactors
- 3.2 Extended aeration
- 3.3 Pure oxygen driven aeration
- 3.4 High oxygen transfer through deep shaft or tower reactors
- 3.5 Powdered activated carbon (PAC) assisted activated sludge
- 3.6 Multistage systems/ A-B process
- 3.7 Aerobic granulation

- 4 Membrane bioreactors
- 4.1 Introduction
- 4.2 MBR configurations

- 5 Biofilm based wastewater treatment
- 5.1 Fundamentals of substrate utilization in biofilms
- 5.2 Biofilm-based treatment processes

- 6 Resource recovery from wastewater
- 6.1 Water recovery: a case study for Flanders (text after IWVA)
- 6.2 Energy
- 6.3 Biosolids

- 7 Economic aspects of wastewater treatment
- 7.1 General breakdown of costs
- 7.2 Specific for Flanders - Calculations of the water pollution taxes

- 8 Biological aspects of drinking water production
- 8.1 Introduction: legislation, quality levels
- 8.2 Drinking water from groundwater
- 8.3 Drinking water from surface water

Begincompetenties

*General

A general scientific background (biology, chemistry, physics and mathematics) at academic level is required.

*Sequentiality

Module 1: Global water problems and integrated water management

Module 2: Integrated assessment of water and sediment quality

Eindcompetenties

- 1 After Part A: To have insight in the physicochemical methods which are used in treating several water systems. This course part focusses on physicochemical water treatment and sludge treatment. The practical part includes laboratory exercises and industrial site visits.
- 2 After part B: Knowledge of important environmental engineering processes that rely on microbiology, in particular drinking water production and wastewater treatment. Details are provided on how activated sludge works, how nutrient removal is achieved and what the key parameters are driving the process. further we study biofilm based wastewater treatment and state-of-the-art technology such as membrane bioreactors

Creditcontractvoorwaarde

Toelating tot dit opleidingsonderdeel via creditcontract is mogelijk mits gunstige beoordeling van de competenties

Examencontractvoorwaarde

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

Didactische werkvormen

Hoorcollege, practicum, zelfstandig werk, werkcollege: geleide oefeningen

Toelichtingen bij de didactische werkvormen

Theory: oral lectures

Exercises: are given during the lectures and as take-home exercises, as well as laboratory exercises and plant visits

Leermateriaal

1. Syllabus
2. Selected capita from: "Wastewater Engineering: Treatment And Reuse" (2002), by Metcalf & Eddy Inc., George Tchobanoglous, Franklin L Burton and H. David Stensel, McGraw-Hill Education - Europe (London - United States), 1408 p., ISBN 9780071241403

Referenties

see references in the notes

Vakinhoudelijke studiebegeleiding

Evaluatiemomenten

periodegebonden evaluatie

Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode

Schriftelijk examen, openboekexamen, mondeling examen

Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode

Schriftelijk examen, openboekexamen, mondeling examen

Evaluatievormen bij niet-periodegebonden evaluatie

Tweede examenkans in geval van niet-periodegebonden evaluatie

Examen in de tweede examenperiode is mogelijk

Toelichtingen bij de evaluatievormen

Theory: period aligned evaluation

Theory: written examination (partially open and partially closed book) and oral examination

Practical part: continuous evaluation

Eindscoreberekening