

## Inland Waterways and Locks (E054820)

Course size (nominal values; actual values may depend on programme)  
Credits 6.0 Study time 180 h Contact hrs 60.0 h

### Course offerings and teaching methods in academic year 2018-2019

Offering	Language	Teaching Methods	Hours
A (semester 2)	Dutch	guided self-study	30.0 h
		seminar	15.0 h
		project	15.0 h
B (semester 2)	English	seminar	15.0 h
		lecture	30.0 h
		project	15.0 h
C (semester 2)	Dutch	guided self-study	30.0 h
		seminar	15.0 h
		project	15.0 h
D (semester 2)	English	seminar	15.0 h
		project	15.0 h
		lecture	30.0 h

### Lecturers in academic year 2018-2019

De Mulder, Tom TW15 lecturer-in-charge

### Offered in the following programmes in 2018-2019

Programme	crdts	offering
<a href="#">Bridging Programme Master of Science in Civil Engineering</a>	4	C
<a href="#">Bridging Programme Master of Science in Civil Engineering</a>	4	D
<a href="#">Master of Science in Civil Engineering</a>	6	A
<a href="#">Master of Science in Civil Engineering</a>	6	B

### Teaching languages

Dutch, English

### Keywords

hydraulic engineering, navigation, rivers, canals, bed and bank protection, locks, weirs, dredging

### Position of the course

This first course of hydraulic works intends to give general information about navigation and hydraulic works.

The student will acquire insight into the concept and the execution of regulation works in rivers (in order to improve navigation and discharge of water) as well as in the design and construction of canals.

Special attention is devoted to bank and bottom protection.

This course also deals with the concept and design of locks and weirs.

The last part of the course provides an introduction to dredging, which is an important tool in the execution of hydraulic works.

### Contents

- Navigation and waterways
- Rivers: Training works, River regulation, Canalization
- Canals
- Sluices and navigation locks: levelling systems, lock gates
- Weirs
- Fish passes

- Hydropower production
- Bed and bank protection
- Dredging: Dredging tools, hydraulic transport, dredging cycle

#### Initial competences

Hydraulics, Sediment transport, Building materials

#### Final competences

- 1 Being familiar with CEMT classification of inland navigation and its role in design of waterways
- 2 Having insight into factors influencing the geometrical characteristics of a waterway, including lock-complexes
- 3 Knowing the different means of infrastructural measures to improve the navigability of a river (river training, normalization, canalization) and their respective range of applicability
- 4 Having insight into the role of the water balance and the soil balance in the design of a canal
- 5 Being able to discern the major components of a navigation lock and knowing their function
- 6 Being able to discern the major components of mitre gates and rolling gates
- 7 Having insight into the respective mode of operation of mitre gates and rolling gates and into the load transfer
- 8 Knowing the different types of lock filling-emptying systems and having insight into their respective range of applicability
- 9 Having insight into the hydraulic phenomena and the associated design criteria for a lock filling-emptying system
- 10 Being able to discern the different types of movable weirs and having insight into their respective range of applicability
- 11 Being able to discern the different components of a lock-weir complex (eventually with a fish pass and hydropower production)
- 12 Having insight into the different means and measures to minimize the water consumption in waterways
- 13 Having insight into ship-induced loads on bed and banks of waterways
- 14 Being able to design a stable bed and bank protection consisting of riprap and a filter
- 15 Having knowledge of bed and bank protection types other than riprap
- 16 Having insight into the pro's and con's of permeable and non-permeable revetments
- 17 Knowing the different types of dredging tools and their respective way of operation
- 18 Knowing the different means to transport dredged material

#### Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

#### Conditions for exam contract

This course unit cannot be taken via an exam contract

#### Teaching methods

Guided self-study, lecture, project, seminar

#### Learning materials and price

Syllabus can be purchased for ca. 25 EUR at VTK (Plateau building)

#### References

- Course notes "Hydraulica" and "Water management & Environment"
- Waterway guidelines (publ. Directoraat-Generaal Rijkswaterstaat, Nederland, 2011)
- Design of locks, volumes 1 en 2 (publ. Directoraat-Generaal Rijkswaterstaat, Nederland, 2000)
- Hydraulic structures: locks (W.F. Molenaar, 2011)
- Final report of the international commission for the study of locks (PIANC, 1986)
- Innovations in navigation lock design (PIANC, Report n°106 of Working Group 29, 2009)
- Ship behaviour in locks and locks approaches (PIANC, report n° 155, 2015)
- Design of movable weirs and storm surge barriers (PIANC, Report of InCom Working Group 26, 2005)
- The Rock Manual
- Guidelines for protecting berthing structures from scour caused by ships (PIANC, Report n° 180, 2015)
- Introduction to bed, bank and shore protection (G.J. Schiereck & H.J. Verhagen, 2012)

- Introduction to dredging equipment (W.J. Vlasblom, 2003)

#### Course content-related study coaching

#### Evaluation methods

end-of-term evaluation and continuous assessment

#### Examination methods in case of periodic evaluation during the first examination period

Oral examination

#### Examination methods in case of periodic evaluation during the second examination period

Oral examination

#### Examination methods in case of permanent evaluation

Report

#### Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

#### Extra information on the examination methods

- Periodic evaluation (during examination period): oral closed-book exam, written preparation. The detailed description of the topics that might be evaluated at the exam is made available on Minerva prior to the examination period.
- Permanent evaluation (during semester): graded project reports.

#### Calculation of the examination mark

Special conditions:

Weight: permanent evaluation (40%) and periodic evaluation (60%).