

River Morphology and Hydrodynamics (I001939)

Course size (nominal values; actual values may depend on programme)

Credits	3.0	Study time	90 h	Contact hrs	38.0 h
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Course offerings and teaching methods in academic year 2016-2017

A (semester 1)	English	excursion	7.5 h
		lecture	23.75 h
		group work	7.5 h

Lecturers in academic year 2016-2017

De Mulder, Tom	TW15	lecturer-in-charge
Temmerman, Stijn	UA	co-lecturer

Offered in the following programmes in 2016-2017

	crdts	offering
Master of Science in Technology for Integrated Water Management	3	A

Teaching languages

English

Keywords

basic engineering fluid dynamics, open channel flow, regulation of flood waves, sediment transport, river morphology, tidal rivers, wind waves

Position of the course

The hydrodynamics of the river system, caused by transport of water combined with tidal effects and wind generated waves, and the related transport of sediments as the primary origin for morphological changes of the river system, are the driving forces for many ecological processes. Moreover, there is a strong influence of vegetation on hydrodynamics and morphology.

A basic understanding of the transport processes of water and sediment and the interaction with vegetation is required to understand the river hydrodynamics (e.g. varying water levels or flooding), the morphological behavior of river beds (e.g. navigation channels and mud flats), the design of bank protections (e.g. dike revetments), and inland water transport (e.g. requirements for ships).

Contents

The objective of this course module "River hydrodynamics and morphology" is to provide insight in these basic processes, and to integrate these in order to be able to evaluate the river system dynamics and local and global effects of environmental change and human impact (e.g. river engineering works).

In order to achieve these objectives, the following topics are presented:

- a basic engineering introduction in fluid dynamics and (un-)steady open channel flow
- flood wave propagation in a river
- regulation of flood waves by using (un-)regulated reservoirs
- basics of sediment transport (sediment properties, inception of motion, bed load and suspended load transport formulae)
- river morphology (bed forms, river networks: formation and geometric properties, geometry and mechanics of meandering streams)
- interaction between river flow, vegetation and morphology
- tides and tidal rivers
- wind waves (generation, basic engineering wave properties using linear wave theory, wave transformations in shallow water)

Initial competences

*General

A general scientific background (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

Final competences

The objective of this module is to provide insight in the basic transport processes related to water and sediment, and in the related morphological behavior of a tidal river, and to provide integration for a better evaluation of the river system dynamics and of river engineering works.

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

Excursion, group work, lecture

Extra information on the teaching methods

Theory: oral lectures and integration seminar

Exercises: given during the lectures and as take-home exercise

Excursion: field excursion to visit practical test cases

Learning materials and price

Syllabus & slides

References

- van Rijn LC, 1993, Principles of sediment transport in rivers, estuaries and coastal seas, Aqua Publications, The Netherlands.
- Dean, R.G. and R.A. Dalrymple, 1991, Water wave mechanics for engineers and scientists. Singapore: World Scientific.

Course content-related study coaching

Staff can be contacted by email for appointment and/or questions. Use of Blackboard/Minerva platform.

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination, oral examination

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

Written examination, 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 not possible

Extra information on the examination methods

Theory: partly oral examination with written preparation, partly written examination without oral presentation

Exercises: written reports on exercises

The report on the exercises has to be submitted before the examination, in order to be able to pass the exam.

Calculation of the examination mark

Theory counts for 70%, exercises for 30%.