AE2612 Hydraulic Engineering 7.5 credits

Vattenbyggnad

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for AE2612 valid from Autumn 2012

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

The Built Environment

Specific prerequisites

Proficiency in English (English B or equivalent) Bachelor's degree in the field of civil engineering, environmental engineering, or another subject with clear relevance to the course, of at least 180 higher education credits, which includes the following: Basic knowledge in mathematics for at least 20 higher education credits; Basic knowledge in numerical analysis, programming, or equivalent, for at least 6 higher education credits; Fluid mechanics for at least 5 credits; Hydrology for at least 7.5 credits.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After the course the student should be able to:

Describe and explain the design principles of concrete and embankment dams and perform stability computations for some of these dam types.

Perform hydraulic design of spillways and energy dissipators, channels and tubes and perform technical - economical optimization of pipes and channels.

Perform computations for different types of unsteady flow, for example: water hammer, mass oscillations in pipe systems - surge chambers, surge waves in open channels.

Describe the erosion process and design erosion protection for a channel.

Describe and explain the design and hydraulic function of a hydroelectric power plant and perform hydraulic calculations.

Make computations for river regulation for hydropower, water supply and irrigation and calculate the energy production in hydropower plants.

Describe the mechanics of wind generated waves and make wave height calculations.

Calculate forces caused by breaking waves.

Course contents

Concrete and embankment dams: loads, design function, stability, surveillance

Spillways: hydraulic design and computations of overflow spillways, bottom outlets and energy dissipators

Transport of water: channels, tunnels, tubes, technical and economical design of tubes and channels

Hydraulics: unsteady flow, water hammer, mass oscillation and pressure transients in pipes and surge shafts, surge waves in channels

Erosion: critical shear stress, Shields diagram, design of erosion protection

Hydropower plants: design, fundamental hydraulic computations

River regulation for hydropower, water supply and irrigation: hydrological background, yearly and short term regulation, energy production in hydropower plants

Wind generated waves: wave mechanics, computation of wave heights, shoaling water, refraction and diffraction. Forces caused by breaking waves.

Course literature

Bergh, H. (2010) Compendium in hydraulic engineering. Div of River engineering, KTH

Equipment

Allowable aids at examination: calculator.

Examination

- ÖVN1 - Assignment, 4.0 credits, grading scale: P, F
- TEN1 - Written Examination, 3.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.