

SYLLABUS

Natural Water Transport Processes 7.5 credits V0021B

Naturliga vattentransportprocesser

Course syllabus admitted: Autumn 2024 Sp 1 - Present

**DECISION DATE
2024-02-14**

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Naturliga vattentransportprocesser

First cycle, V0021B

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	VA-teknik	Civil Engineering

Main field of study

Natural Resources Engineering

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language + Swedish upper secondary school courses Physics 2, Chemistry 1, Mathematics 4 or Mathematics E.

Selection

The selection is based on final school grades or Swedish Scholastic Aptitude Test.

Course Aim

After completing the course, participants should be able to:

Hydrology:

1. Describe the hydrologic cycle and how it is affected by anthropogenic activities, including climate change.
2. Describe different water fluxes (precipitation, flow, evapotranspiration, infiltration, and groundwater flow) and how they can be measured, discuss uncertainties associated with the different measurement methods, and carry out basic hydrologic measurements (profile, level and flow of streams)
3. Carry out water balance and hydrograph calculations using a computer program, with the following terms calculated according to specified methods: runoff (unit hydrograph & linear reservoir), snow-melt (degree-day method), evaporation (aerodynamic method), evapotranspiration (Penman-Monteith) & infiltration (Green-Ampt).

Hydraulics:

4. Solve basic problems based on the fundamental laws of hydraulics (e.g. calculate hydrostatic pressure, water levels, velocities and flows)
5. Identify different flow conditions and perform calculations regarding the transition from one condition to another
6. Identify the calculation procedure for basic problems of open-channel flow and solve them.

Contents

This course gives you an opportunity to understand the processes governing the transport of surface water in natural freshwater systems, including both hydrology and hydraulics. More specifically, the following topics are covered: the hydrologic cycle and how it is affected by climate change and urbanization, precipitation (rainfall, snow and snowmelt), evapotranspiration, infiltration, runoff, groundwater, hydrostatics, hydrodynamics and open-channel flow. You will also measure the flow rate in a natural stream using different methods. Knowledge obtained in this course is fundamental to the fields of flood risk management, water resources management, urban water engineering, freshwater ecology, hydropower, and mining. Due to weather conditions, the field exercise is carried out during Study period 1.

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

This course includes a variety of learning activities. The hydrology part of the course includes lectures, readings from the course literature and mandatory online quizzes based on calculation tasks, as well as a field exercise wherein flow is measured in a stream using different methods. Due to weather conditions, the field exercise is carried out during Study period 1. To clarify the interdependency of the different hydrologic terms, the unit culminates with a group calculation task where students calculate the water fluxes in a catchment using the methods taught in the course and present the results in written report.

The hydraulics part is taught through lectures, readings from the course literature and at-home calculation exercises and is assessed through a written exam.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. Course aims 1-3 are examined through a series of individual online quizzes based on calculation tasks (Module 0007) and a written report (Module 0008). For course aim 2 the examination also includes a field exercise (Module 0006), for which a report is written in a small group. Course aims 4-6 are assessed through an individual written exam.

For modules that include group work (0006, 0008) each student is required to actively participate throughout the group work. The grades for individual students can differ from those for the rest of the group.

To pass this course, all items of the examination must be passed. If a student does not participate in the field exercise, it is possible to participate in this activity during a subsequent school year, if sufficient places are available. Module 0006 is graded pass/fail. Modules 0005, 0007 and 0008 are graded on the scale U 3 4 5. The final grade for the course is a credit-weighted average of the grades on 0005, 0007 and 0008.

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Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term "unauthorized aids" refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Remarks

The hydraulics module in this course corresponds to the hydraulics part of V0014B Hydraulics and Geology; therefore, these courses cannot be included in the same degree.

Overlap

The course V0021B is equal to V0014B, V0017B

This course is equivalent to Natural Water Transport Processes V0017B.

Course offered by

Department of Civil, Environmental and Natural Resources Engineering

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0005	Written exam Hydraulics	G U 3 4 5	3.2	Mandatory	A22	
0006	Flow measurement field task	U G#	0.4	Mandatory	A24	
0007	Hydrology quizzes	G U 3 4 5	1.4	Mandatory	A24	
0008	Hydrology calculation task	G U 3 4 5	2.5	Mandatory	A24	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Assistant Director of Undergraduate Studies Eva Gunneriusson, Department of Civil, Environmental and Natural Resources Engineering 2024-02-14

Syllabus established

by Assistant Director of Undergraduate Studies Eva Gunneriusson, Department of Civil, Environmental and Natural Resources Engineering 2022-02-11